UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

OCTOBER, 1889.

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PREPARED UNDER THE DIRECTION OF
BRIGADIER GENERAL A. W. GREELY,
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1889.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of October, 1889.

	Name of vessel.	Captain.
Br.	s. s. Aberaca	J. Temple.
Am.	Adirondack	J. Sansom.
Br.	Adriatic	J. G. Cameron.
	Advance	D. Griffiths.
	Ailsa	J. W. Morris.
	Alaska	G. S. Murray.
	Alene	E. J. Seidera.
Am.	Algiers	F. W. Mason.
Ger.	Allemannia	G. Thiele.
	Aller	H. Christoffers.
Br.	Alvena	F. McKay.
	Alvo	David Williams.
Ger.	America	A. Kohlmann.
Dtch.	Amsterdam	G. Stenger.
Br.	Anchoria	A. Campbell.
	Angers	James Pinkham.
	Arabic	W. M. Smith.
	Ardangorm	H. Cameron.
	Arisona	S. Brooks.
	Athos	H. Low.
Ger.	Augusta Victoria	A. Albers.
Br.	Aurania	H. McKay.
	Author	R. Owen.
	Avon	W. H. Milner.
	Baltimore	J. W. Simpson.
	Barrowmore	W. H. Moore.
Ger.	Baumwall	C. W. Rhese.
Br.	Bavarian	M. Fitt.
	Bayonne	J. E. Payne.
Belg.	Belgenland	R. Weyer.
Br.	Bellena	J. McMillan.
	Bengore Head	D. Smith.
Span.	Benita	L. Santaulari.
Br.	Borderer	F. Manley.
	Boston City	G. H. Doyle.
	Britannic	H. Davison.
	British Empire	R. Wills.
	British King	John Kelly.
	British Prince	S. Nowell.
	British Princess	E. H. Freeth.
	Brooklyn City	W. Fitt.
	Buffalo	J. H. Malet.
	Bulgarian	R. Leask.
Ger.	California	H. Baur.
Br.	Camellia	E. Penney.
	Canada	J. Robinson.
Ger.	Capua	G. Kuchenthal.
Br.	Carroll	G. H. Brown.
	Caspian	A. McDougall.
	Catalonia	J. J. Atkin.
	Cephalonia	Thomas Dutton.
Am.	Chalmette	Geo. Mason.
Fr.	Chateau Lafite	M. C. Olliver.
Am.	Charles Morand	W. H. Marshall.
	Cherokee	H. A. Bearse.
Br.	Circassia	J. Harris.
	Circassian	R. Barrett.
Am.	City of Alexandria	J. McIntosh.
	City of Augusta	J. W. Catherine.
Br.	City of Berlin	Francis S. Land.
	City of Chicago	A. Redford.
	City of New York	A. W. Lewis.
Am.	City of Para	J. L. Lockwood.
Br.	City of Paris	F. Watkins.
	City of Rome	H. Young.
	Claribel	Thos. McKnight.
	Colina	R. C. Jennings.
	Colon	F. Henderson.
Ger.	Colonia	A. Worpel.
Am.	Colorado	F. E. Jenkins.
Ger.	Columbia	C. Hebich.
Br.	Counsellor	J. G. Jones.
	Croma	W. N. Lord.
	Crystal	R. B. Stannard.
	Cuba	R. Nicol.
	Dalton	J. Russell.
	Damara	Geo. Dixon
	Denmark	R. S. Rigby.
	Devonia	Jno. Craig.
	Dunholme	T. Matthews.
	Durham City	J. A. Jacobsen.
	Earnwell	W. H. Carter.
Dtch.	Edam	W. Bakker.
Br.	Edwin	W. T. Stacey.
	Eggleston Abbey	J. Cooper.
	Egypt	J. Sumner.
Ger.	Elder	H. Baur.
	Elbe	R. Sander.
	Elgiva	H. Bermpohl.
Br.	El Monte	R. B. Quick.
	Elmville	J. Dove.
Am.	El Paso	H. S. Quick.
Ger.	Ems	T. Jungst.
Br.	England	A. F. Heeley.
Span.	Enrique	R. de Aberaturi.
Br.	Erato	F. Simmons.
Br.	Erin	W. Tyson.
	Esk	T. K. Erham.
	Ethiopia	John Wilson.
	Etruria	W. H. P. Hains.
	Exeter City	T. L. Weiss.
Am.	Excelsior	H. L. Higgins.
Br.	Federation	R. Pinkham.
	Ferrando	M. Hetherington.
	France	A. D. Hadley.
	Forward	Scott Gray.
Ger.	Fulda	R. Ringk.
Br.	Galileo	W. Magee.
	Gallia	M. Murphy.
Ger.	Gellert	C. Kaempff.
Br.	Germanic	H. Davison.
	Gilsland	M. L. Robinson.
	Gleadowe	O. H. Bommen.
	Glenfield	J. Newdick.
	Gloucester City	R. Jones.
Ger.	Gluckauf	V. Saymanski.
Br.	Godrevy	W. H. Jamieson.
Ger.	Gothia	A. Kuhn.
	Grecian	C. E. De Gallais.
	Greece	A. J. Jeffroy.
Span.	Guido	E. Lachiondo.
Ger.	Gut Heil	A. Buhner.
	Hammonia	Kuhlewein.
Dan.	Hekla	A. G. Thomsen.
Br.	Helvetia	G. Cochrane.
Ger.	Helvetia	R. Landerer.
	Hermann	W. Schmolder.

	Name of vessel.	Captain.
Br.	s. s. Hibernian	John Brown.
	Hindoo	Jas. Douglas.
	Holland	Thos. Foote.
	Horace	P. Dalziel.
	Horrox	T. Hening.
	Huntingdon	Leng.
	India	B. Jamieson.
Am.	Indiana	W. J. Boggs.
It.	Iniziativa	A. Conzoneri.
Br.	Iowa	E. W. Owens.
Dan.	Island	W. Skjodt.
Br.	Istrian	A. W. Ball.
Ger.	Italia	G. Schmidt.
Br.	Italia	Thos. Craig.
	Italy	W. Pearce.
	Ixia	Wm. Churnside.
	Jamiacan	D. Edwards.
	Kansas	A. Fenton.
	Kate Fawcett	C. F. Young.
	Kepler	M. Fleet.
Nor.	Kong Alp	J. Dahl.
Fr.	La Bourgogne	E. Franguel.
	La Bretagne	M. de Jousselin.
	La Champagne	Boyer.
Br.	La Flandre	E. Smit.
Fr.	La Gascogne	Santelli.
Ger.	Lahn	H. Heilmers.
Br.	Lake Huron	P. D. Murray.
	Lake Nepigon	C. F. Herriman.
	Lake Ontario	H. Campbell.
	Lake Superior	Wm. Stewart.
	Lake Winnipeg	F. Carey.
Am.	Lampassas	George Elgen.
Span.	Leonora	J. de Alegria.
Br.	Lero	J. Chisholm.
	Lisnacrieve	F. R. Evans.
	Lord Clive	P. Urquhart.
	Lord Gough	E. M. Hughes.
	Lord O'Neill	A. Ferris.
Am.	Louisiana	E. V. Gager.
Br.	Lydian Monarch	T. C. Huggett.
Ger.	Main	M. Moller.
Br.	Maine	R. Griffith.
	Manitoban	J. M. Johnstone.
Ger.	Marsala	N. Maass.
Br.	Martello	Wm. Abbott.
	Maryland	A. H. Luckhurst.
	Mascotte	Jas. Ross.
Span.	Mendez Nunez	J. Lopez.
Br.	Mentmore	R. Waite.
	Michigan	S. Walters.
	Minnesota	R. J. Blacklin.
	Missouri	H. Murrell.
	Montana	W. H. Williams.
Ger.	Moravia	Winkler.
Am.	Mount Edgcombe	J. Wetherell.
Br.	Muriel	G. S. Locke.
	Naranja	J. Scilly.
Span.	Navarro	S. de Aldecocoa.
Br.	Navigator	J. Woodcock.
Belg.	Nederland	E. Bence.
Br.	Nestorian	J. France.
Fr.	Neustria	P. Verries.
Br.	Nevada	J. A. Stewart.
Am.	Newport	C. C. Lima.
	New Orleans	T. P. C. Halsey.
Belg.	Noordland	H. E. Nickels.
Br.	Norseman	R. Williams.
	Northgate	W. Ramsdale.
	Nova Scotian	R. H. Hughes.
Am.	Nueces	Sam Risk.
Ger.	Nurnberg	H. Engelbart.
Dtch.	Obdam	G. Bakker.
Br.	Oceanic	C. H. Kempson.
Am.	Ohio	R. W. Sargent.
Br.	Ontario	W. P. Couch.
	Oranmore	B. Jones.
	Oregon	H. C. Williams.
	Orinoco	J. S. Garvin.
	Osmanli	C. O'Hagan.
	Othello	H. Mundy.
	Palestine	W. Whiteway.
	Para	James Brander.
	Parisian	J. Ritchie.
	Pavonia	A. McKay.
	Pawnee	J. James.
Dtch.	P. Caland	G. Luts.
Belg.	Pennland	H. Buschmann.
Am.	Pennsylvania	E. B. Thomas.
Br.	Peruvian	J. W. Wallace.
	Phœnician	J. Kerr.
	Picqua	J. T. Lund.
Ger.	Polynesia	G. Franck.
Br.	Ponca	W. Bowen.
	Pontiac	R. Blythe.
	Port Caroline	J. Sarrock.
Am.	Portia	F. Ash.
Ger.	Prussian	C. Pohle.
Dtch.	Prins Maurits	A. Sibbelee.
	Prins William I	J. T. Dorr.
Br.	Prussian	J. Ambury.
	Professor	G. H. Kefler.
Ger.	Rhaetia	H. Vogelgesang.
	Rhein	W. Kuhlmann.
	Rhenania	Schaffer.
Belg.	Rhynland	A. J. Griffin.
Br.	Richmond	E. S. Clapp.
	Richmond Hill	H. H. Perry.
	Ripon City	J. Brotchie.
	Robinia	T. H. Smith.
	Rochdale	T. D. Trindale.
	Roman	E. Maddox.
	Rossmore	J. Inch.
Dtch.	Rotterdam	H. C. v. d. Zee.
Ger.	Rugia	R. Karlowa.
	Saale	H. Richter.
Br.	St. Asaph	C. H. Hossock.
	Saint Ronans	H. Campbell.
	Salerno	B. H. Rogers.
	Samaria	T. Hewitson.
Am.	Santiago	J. B. Allen.
Br.	Santiago	R. Potter.
	Sardinian	W. Richardson.
	Sarnia	J. Gibson.
	Scandinavian	J. Park.
	Scythia	T. Roberts.
Am.	Seneca	F. Stevens.

	Name of vessel.	Captain.
Br.	s. s. Servia	H. Walker.
	Siberian	R. P. Moore.
Nor.	Sif	H. Bentzon.
Br.	Sirius	T. P. Fisher.
	Spain	W. A. Griffiths.
	State of Georgia	G. Moodie.
	State of Indiana	A. Ritchie.
	State of Nebraska	A. G. Braes.
	State of Nevada	J. A. Stewart.
	State of Pennsylvania	A. J. A. Mann.
	State of Texas	G. Williams.
	Stockholm City	W. Thompson.
	Strathairly	D. Boughton.
Ger.	Strassburg	F. Rodenburg.
	Suevia	C. Ludwig.
Belg.	Switzerland	J. Ueberweg.
Ger.	Taormina	G. W. Koch.
Br.	Teutonic	H. Parsell.
	The Queen	T. P. Heeley.
Dan.	Thingvalla	S. T. H. Laub.
Br.	Toronto	J. MacAuley.
	Tower Hill	R. P. Bennett.
Nor.	Tordenskjold	C. Urchermann.
Ger.	Trave	W. Willigerod.
Br.	Trinacria	G. Mitchell.
	Trinidad	J. S. Garvin.
	Ulunda	T. Clark.
	Umbria	W. McMickan.
	Vancouver	C. J. Lindall.
	Vandyck	T. Phelan.
Dtch.	Veendam	A. J. Potjer.
Br.	Venetian	E. Parry.
	Virginian	W. C. Fry.
	Waldensian	A. Whyite.
	Waverly	R. Calvert.
Ger.	Werra	R. Bussius.
Belg.	Westernland	J. C. Jamison.
Ger.	Wieland	H. Barends.
Br.	Wisconsin	J. P. Worral.
	Wylo	T. Rogers.
	Wyoming	C. L. Rigby.
	United States Naval.	
U. S.	F. C. Albatross	Z. L. Tanner.
U. S.	S. Boston	J. O'Kane.
U. S.	S. Chicago	H. B. Robeson.
U. S.	S. Despatch	W. S. Cowles.
U. S.	S. Dolphin	R. Clover.
U. S.	C. & G. S. schr. Earnest	J. N. Jordan.
U. S.	S. Enterprise	B. H. McCalla.
U. S.	C. S. schr. Eagre	W. P. Elliott.
U. S.	S. Galena	G. W. Sumner.
U. S.	C. S. Gedney	J. M. Helm.
U. S.	C. & G. S. McArthur	D. H. Mahan.
U. S.	S. Minnesota	G. C. Wiltse.
U. S.	S. Monongahela	G. E. Wingate.
U. S.	S. Ossipee	R. D. Evans.
U. S.	S. Ranger	F. A. Cook.
	Sailing vessels.	
Br.	bk. Adamantine	J. Clark.
Am.	Ada P. Gould	W. B. Henrahan.
Br.	bk. Ada Peard	N. Hocken.
Ger.	Augusta	H. Schumacher.
Am.	Amy	H. E. Kiager.
	bg. Arcot	J. W. Cates.
Br.	sp. Argus	R. Ramsey.
	bk. Argyle	C. O. Allen.
Nor.	Carsten Boe	E. Mathieson.
Am.	Chas. F. Ward	J. L. Coombs.
Ger.	sp. Chas. Luling	C. Wiche.
Br.	Chas. S. Whitney	Geo. D. Spicer.
Ger.	bk. China	T. Selberg.
Am.	schr. Clara Goodwin	F. Wyman.
	Comet	W. H. Aldrich.
	Elbridge Souther	J. T. Fales.
Fr.	bk. Ferdinand de Lesseps	Geffroy.
Nor.	Fruen	B. Bessesen.
Br.	bg. George	Arthur Edgett.
	schr. Glen	E. P. Fullerton.
Am.	sp. Glendon	E. Thacher.
	bkt. Golden Sheaf	W. Chandler.
	bg. Henry Stewart	W. F. Blake.
Br.	bkt. Hattie H	I. H. Dill.
Am.	bg. H. B. Hussey	G. W. Hodgdon.
	schr. Henry A. Faber	H. E. Garlick.
Ger.	bk. Hermon	O. Olsen.
Br.	Inveresk	G. Bragg.
	Ivigtut	W. Anderson.
Am.	sp. Jacob E. Ridgway	Jarvis Call.
	bk. Jane Adeline	G. W. Cates.
	schr. Jennie S	Chas. Sinclair.
Nor.	bk. Johan Ivgens	I. Iversen.
Am.	John D. Brewer	W. J. Josselyn.
	schr. John R. Bergen	W. H. Squires.
	pilot Joseph F. Loubat	J. McCarthy.
Br.	bg. Julia Blake	John Rudols.
Am.	bk. Julia Rollins	J. J. Johnson.
Port.	Julius	F. D. Vieira.
Am.	schr. Kate Church	J. H. Weeks.
	bk. Kennard	J. A. Bettencourt.
Br.	Konoma	J. Thompson.
Am.	bg. L. F. Munson	J. V. McKowen.
	sp. Light vessel No. 45	Andrew Jackson.
	schr. Maud H. Dudley	D. W. Oliver.
	bkt. Monsita	F. M. Wallace.
Dan.	bkt. Nanna	M. J. Neilson.
Am.	schr. Nelson Bartlett	J. W. Watts.
Nor.	bk. P. A. Munch	Chr. Bernt.
It.	Peppina	F. Janello.
Nor.	Qvos	G. Olsen.
	Ran	N. A. Maroni.
Dan.	Rialto	L. P. Jorgenson.
Am.	bg. Robert Mowe	W. Peterson.
Br.	bk. Salina	J. Peterson.
Ger.	bk. Soli-Deo-Gloria	F. Abendroth.
Am.	sp. S. P. Hitchcock	J. B. Nichols.
Nor.	bk. Svea	E. Thorildsen.
Am.	Taria Topan	E. B. Trumbull.
Am.	Thomas A. Goddard	A. C. Sears.
Br.	bg. Ubaldiena	H. F. Schive.
	bk. Valona	H. Andrews.
	sp. Vandura	R. Skinner.
Nor.	bk. Vasa	T. Tallaksen.
Am.	bk. Western Belle	P. F. Bittman.
	bkt. Wm. H. Dietz	D. B. Darrah.
	schr. Wm. Wilson	C. S. Powell.
	bk. Xenia	N. E. Boyer.
Br.	sp. Zimi	D. Lloyd.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVII. WASHINGTON CITY, OCTOBER, 1889. No. 10.

INTRODUCTION.

This REVIEW is based on reports for October, 1889, from 2,321 regular and voluntary observers in the United States and Canada. These reports are classified as follows: 177 reports from Signal Service stations; 121 monthly registers from United States Army post surgeons; 1,414 monthly registers from state weather service and voluntary observers; 36 reports of rainfall observations in Arizona and New Mexico, furnished by the United States Geological Survey; 25 reports from Canadian stations; 169 reports through the Central Pacific Railway Company; 379 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Dakota, Illinois, Indiana, Iowa, the Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR OCTOBER, 1889.

The severest storms of the month occurred along and off the Atlantic coast from the south New England coast to the Carolinas from the 14th to 16th and on the 23d and 24th, when gales of great violence, attaining hurricane force at sea from the 14th to 16th, were reported. Over the north Atlantic Ocean, in addition to the disturbances of the 14th to 16th, 23d, and 24th, referred to, severe gales were reported north and northeast of Bermuda on the 5th, and over mid-ocean on the 16th and 17th. On the 7th destructive gales prevailed over and near the British Isles, and the barometer fell to 28.70 over Scotland. From this date until the 10th stormy weather prevailed in that region, and on the 9th the barometer fell below 28.80 over the more northern parts of Great Britain. The Arctic ice reported near Newfoundland and the Grand Banks was largely in excess of the average amount for the month.

The month was cooler than the average October east of the Rocky Mountains, except in Dakota, Texas west of the ninety-eighth meridian, and at stations in New Brunswick and Nova Scotia. In the Rocky Mountain and plateau regions and on the Pacific coast the mean temperature was above the average for the month. The greatest departures below the average temperature were noted from the middle Atlantic and North Carolina coasts northward over the Lake region, where they exceeded five degrees, and the most marked departures above the average temperature occurred in the northern plateau region and on the northeastern slope of the Rocky Mountains, where they exceeded five degrees. The highest mean temperature reported was 84°.5, at Fort Brown, Tex., and the lowest means were 28°.8, at Dolly-Varden Mines, Colo., and 33°.2, at Atlantic, Mich. The highest absolute temperature reported by regular stations of the Signal Service was 106°, at Yuma and Fort McDowell, Ariz. The highest temperature reported by a voluntary observer was 118°, at Indio, Cal. At stations on the southeastern slope of the Rocky Mountains, in Montana, in the plateau regions, along the north and middle Pacific coasts, and at New Orleans, La., the maximum temperature was as high or higher than previously reported for October. The lowest absolute temperature reported by a regular station of the Signal Service was 9°, at Saint Vincent, Minn. The lowest temperature reported by a voluntary observer was —9°, at Pike's Peak, Colo.; at Dolly Varden Mines, Colo., and Weatherford Centre, Vt., a minimum temperature of 0° (zero) was reported. At Portland, Maine, Fort Smith, Ark., Brownsville, Tex., Oswego, N. Y., Lava, N. Mex., and Fort McDowell, Ariz., the minimum temperature was as low or lower than previously reported for October. Frost injurious to vegetation was reported as far south as North Carolina, South Carolina, and northern Mississippi on the 8th, and in Tennessee and northern Alabama on the 31st. The occurrence of killing frost was about one week earlier than usual in North Carolina and South Carolina; about two weeks early in northern Mississippi, while in Alabama and Tennessee it was seasonable.

The most remarkable feature in connection with the precipitation of the month was the heavy rainfall on the middle and south Pacific coasts, which was the heaviest ever reported in those districts for October. The heaviest rainfall for the month fell in north-central California, where at Sims, Shasta Co., 28.57 inches were reported, and it exceeded ten inches along the Oregon coast, in north-central and northwestern California, and on the California coast between the thirty-fourth and thirty-fifth parallels. No rain was reported within an area extending from north-central Montana into the British Possessions, within areas in the western part of northern Dakota, west-central and south-central Minnesota, central Texas, and extreme southern Louisiana and Mississippi. The rainfall was generally less than the average amount for October in the central valleys, the Lake region, the south Atlantic and Gulf states, over the northeastern part of the northern slope of the Rocky Mountains, the northern part of the northern plateau region, the extreme eastern parts of the middle and southern plateau regions, and in the British Possessions from the Gulf of Saint Lawrence to Vancouver Island. It was generally above the average for the month in New England and the middle Atlantic states, the middle and southern slopes of the Rocky Mountains, the plateau regions, and on the Pacific coast. The greatest departures below the average rainfall occurred on the west Gulf coast, where they exceeded five inches, and the most marked excesses on the middle and south Pacific coasts where, between the thirty-fourth and forty-first parallels, they were more than six inches, and in the Sacramento Valley more than seven inches. At Merritt's Island, Fla., Logansport, Ind., Cresco, Iowa, Harrison, Iowa, Grand Coteau, La., Thornville, Mich., Minneapolis, Minn., Fort Shaw, Mont., Lenoir, N. C., Milan, Tenn., New Ulm, Tex.,

and Madison, Wis., the rainfall was the least ever reported for October. The snowfall was unusually heavy for the season in central Colorado, southeastern Wyoming, and in Plumas county, Cal., where it exceeded twenty inches, and amounted to twenty-four inches at Summit, Plumas, Co., Cal., and Fort D. A. Russell, Wyo.

Navigation was interrupted or suspended on the upper Mississippi and upper Tennessee rivers on account of low water, and it was reported that low water in the Erie and Welland canals, attributed to continued easterly winds, rendered the passage of boats through those canals dangerous, if not impracticable, during a greater portion of the month. Damaging drought was general throughout Alabama, Louisiana, Michigan, and Minnesota, in east-central Texas, northern South Carolina, northeastern Indiana and Illinois, northern Iowa, and northwestern Ohio and Wisconsin.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for October, 1889, as determined from observations taken daily at 8 a. m. and 8. p m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for October obtained from observations taken twice daily at the hours named and that determined from hourly observations, varied at the stations named below, as follows: At Washington, D. C., Philadelphia, Pa., New York, N. Y., Boston, Mass., Saint Louis, Mo., and Chicago, Ill., the mean of the 8 a. m. and 8 p. m. observations was higher by .015, .010, .015, .013, .003, and .006, respectively, than the true mean pressure.

For October, 1889, the mean pressure was highest over the lower Missouri and upper Mississippi valleys and the upper lake region, where it was above 30.15, the highest mean reading, 30.21, being noted at La Crosse, Wis. The mean pressure was above 30.00, except on the middle and north Pacific coasts, the western portions of the middle and southern plateau regions, and in the British Possessions west of the one hundred and tenth meridian. The mean pressure was lowest along the extreme north Pacific coast, where it fell to 29.92 at Port Angeles and Fort Canby, Wash., and over the western portion of the southern plateau region, where the lowest mean readings were 29.93 and 29.95, at Yuma, Ariz., and Keeler, Cal., respectively.

Compared with the distribution of mean pressure for September, 1889, an increase in pressure is shown, except on the Pacific coast north of the fortieth parallel and thence eastward over the western part of the northern plateau region, and along the Atlantic coast north of the thirty-fifth parallel. The greatest increase in mean pressure occurred over northern Minnesota and adjoining parts of Ontario and Manitoba, where it exceeded .25, whence it became gradually less marked to the Atlantic, Pacific, and Gulf coasts. The greatest decrease in mean pressure was noted on the immediate north Pacific coast, where it amounted to .15. On the Atlantic coast the greatest decrease in mean pressure was .06, at Yarmouth, N. S. For September, 1889, the mean pressure was highest from Missouri and Arkansas eastward to the Atlantic coast, and from the north Pacific coast eastward over the valleys of the Columbia and Snake rivers, where it rose above 30.05, while for the current month the highest pressure occupies a well-defined area over the north-central part of the country, with included values above 30.15. The area of low pressure in the British Possessions north of Dakota and Montana in the preceding month has disappeared, while within the area of low pressure in the lower Colorado valley there has been an increase of .11 at Yuma, Ariz., and .08, at Keeler, Cal., respectively.

Compared with the normal pressure for October the mean pressure for the current month was above the normal, except from New England and the Saint Lawrence Valley southwestward to the east Gulf coast, along the Pacific coast, and over the northern plateau region. The greatest departures above the normal occurred in the upper lake region, Minnesota, and eastern Dakota, where they varied from .10 to .20. In New Brunswick and Florida the departures above the normal were less than .05. The most marked departures below the normal pressure were noted on the north Pacific coast, where they exceeded .10. Along the immediate Atlantic coast from New England to South Carolina the departures below the normal pressure were more than .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In October, 1889, the monthly ranges were greatest from northeastern Michigan eastward to north-central New York, where they equalled or exceeded 1.00, whence they decreased east-southeastward to .80 on the south New England coast; southward to less than .30 over extreme southern Florida; west-southwest to less than .30 in the lower Colorado valley; and westward to less than .60 on the northeastern slope of the Rocky Mountains, from which region they increased to more than .90 on the north Pacific coast. Along the Atlantic coast the monthly ranges varied from .27 at Key West, Fla., to 1.00 at Oswego, N. Y.; between the eighty-second and ninety-second meridians, .41 at Cedar Keys, Fla., to 1.09 at Sault de Ste. Marie, Mich.; between the Mississippi River and the Rocky Mountains, .39 at Galveston, Tex., to .81 at Bismarck, Dak.; in the Rocky Mountain and plateau regions, .29 at Yuma, Ariz., to .95 at Walla Walla, Wash.; on the Pacific coast, .30 at San Diego, Cal., to .98 at Portland and Roseburgh, Oregon, and Fort Canby, Wash.

AREAS OF HIGH PRESSURE.

Seven well-defined areas of high pressure appeared within the limits of the United States during the month of October, four of which were first observed on the Pacific coast, and four areas disappeared on the Atlantic coast. The areas of high pressure reaching to the north of the Rocky Mountains inclined slightly to the north of east until after the centre of greatest pressure had passed the Rocky Mountains, while the general movement of all areas of high pressure to the east of the Rocky Mountains was to the south of east; and the region of greatest frequency of these disturbances included the territory near the ninetieth meridian north of the fortieth parallel, the greatest number passing over the upper lake region.

The following tables exhibit some of the more prominent characteristics of the high areas:

TABLE I.

No.	First observed.			Last observed.		Duration.	Velocity per h'r.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	Days.	Miles.			Inches.
I.....	1	40	99	36	76	2.5	23.0	2	Parkersburgh, W. Va ..	30.21
II.....	1	40	127	33	87	11.0	*17. 7.	5	Winnipeg, Man.....	30.58
III.....	3	53	102	46	77	1.5	39.0	4	Green Bay, Wis	30.40
IV.....	8	39	127	42	112	3.5	13.0	11	Baker City, Oregon.....	30.34
IVa	12	55	98	42	88	3.5	14.0	14	La Crosse, Wis.....	30.58
IVb.....	14	45	128	31	97	4.5	25.0	17	North Platte, Nebr	30.46
V.....	18	54	117	47	62	6.5	20.0	23	Saugeen, Ont	30.79
VI.....	24	41	117	45	73	6.5	20.0	25	Salt Lake City, Utah	30.36
VII.....	30	41	127	47	120	1.5	20.0	31	Baker City, Oregon	30.60
Mean.	....	45	116	41	88	4.6	20.7	....	.....	30.47

*Seventeen miles, rate of progress until the centre reached the south Atlantic states; seven miles, rate of progress thereafter until it disappeared.

TABLE II.

Number.	Maximum abnormal rise in pressure in twelve hours.			Maximum abnormal fall in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
	Inch.			°					
I.....	.56	Sault Ste. Marie, Mich	1	21	Saint Paul, Minn....	1	40	nw.	2
II....	.64	Medicine Hat, N.W.T	4	28	Medicine Hat, N.W.T	4	42	n.	7
III...	.50	Minnedosa, N. W. T.	3	21	North Platte, Nebr..	3	38	w.	3
IV...	.34	Red Bluff, Cal	8	18	Red Bluff, Cal.....	8	30	sw.	8, 9
IVa..	.30	Qu'Appelle, N. W. T.	12	18	Bismarck, Dak.....	12	56	ne.	13
IVb..	.38	Calgary, N. W. T	15	19	Boisé City, Idaho ...	14	34	ne.	17
V....	.46	Father Point, Quebec	20	25	North Platte, Nebr..	19	42	ne.	24
VI...	.42	Saint Vincent, Minn.	25	17	Cheyenne, Wyo.....	24	46	nw.	24
VII..	.44	Calgary, N. W. T	31	16	Salt Lake City, Utah	30	34	ne.	31

I.—The month opened with an extended area of low pressure covering the northeastern portion of the United States, while a second depression was central north of Montana, and feeble areas of high pressure covered the eastern slope of the Rocky Mountains and the California coast. The general drift to the eastward of these conditions caused the area of high pressure on the eastern slope of the Rocky Mountains to pass over the central valleys during the succeeding forty-eight hours, the pressure increasing slightly during the easterly movement, attended by generally clear weather throughout the eastern portions of the United States. On the morning of the 3d it covered the Atlantic coast, being central over Virginia, and it disappeared during the day in advance of an area of low pressure over the Lake region.

II.—The area of high pressure on the Pacific coast which was observed on the 1st of the month advanced slowly to the northeast, passing over Oregon on the 2d and the Rocky Mountains on the 3d, and by the morning of the 5th it extended over the Northwest and as far eastward as the upper lake region, the pressure having increased decidedly during its easterly movement. After reaching the centre of the continent the direction of movement changed to south, and from the 5th to 8th it passed over the region north of Lake Superior to the lower Ohio valley, with frost as far south as the Gulf States on the night of the 6th, and killing frosts in central Mississippi and North Carolina on the night of the 7th. In its course to the south and east this area was well defined and covered the entire country east of the Rocky Mountains, the pressure diminishing slightly with the southeasterly movement. After the centre reached the lower Ohio valley it passed southeasterly to North Carolina, and thence south and west during the succeeding three days, the pressure decreasing during this interval, and it finally disappeared by gradual decrease of pressure within the limits of the Gulf States on the 12th. This area of high pressure was remarkable from the fact that its movements could be readily traced from the consecutive telegraphic reports from the 1st to the 12th.

III.—While the preceding area of high pressure was central on the Pacific coast number iii appeared north of Manitoba on the 3d; it passed southeasterly over the upper lake region, following quickly the area of low pressure which was in the Saint Lawrence Valley. It passed eastward to that region on the 4th, and disappeared on the same day, unattended by any marked atmospheric disturbance.

IV.—This forms the most noteworthy area of high pressure observed during the month, as it originated on the Pacific coast, and after moving easterly to the north of Minnesota it was re-enforced from the northward by the area of high pressure described as number iv *a*, and the course of direction changed to south, which direction was maintained from the 12th to the 15th, after which a second re-enforcement appeared from the north Pacific, and the centre of greatest pressure was transferred from the Mississippi Valley to Montana, after which the course of movement was to the south over the eastern slope of the Rocky Mountains, the pressure decreasing during the southerly movement, and the area finally disappeared while central over Texas on the 18th. Although this area of high pressure was defined within the limits of observation during ten days, its movements were irregular, and the centres of greatest pressure have been traced as three areas of high pressure and designated as numbers iv, iv *a*, and iv *b* in the tables, numbers iv and iv *a* joining north of Lake Superior, and numbers iv *a* and iv *b* forming a single area central in Montana. In each case before uniting, two well-defined areas of high pressure could be traced upon the weather chart.

V.—Was observed far to the north of Montana on the 18th, and, after remaining almost stationary during twenty-four hours, it passed slowly eastward, the centre of greatest pressure remaining north of and near the boundary of the United States, the pressure increasing at the centre until it exceeded 30.60 over Manitoba on the morning of the 22d, when this area probably covered the north half of the United States. It moved slowly eastward, attended by an area of low pressure which moved eastward at about the same rate from northern Texas to the south Atlantic coast. The area of high pressure passed to the eastward of northern New England on the 24th, and disappeared from the limits of the chart, while the depression to the south passed off the Atlantic coast on the same day, followed by dangerous gales on the Atlantic coast from Hatteras, N. C., to Block Island, R. I.

VI.—This area of high pressure apparently originated over the central plateau region, where it was well defined and central on the morning of the 24th. It moved slowly eastward, increasing in area, and during the next twenty-four hours it covered the entire Rocky Mountain regions, while the pressure at the centre was less than 30.40. It moved easterly to the central valleys where it was central on the 27th, but the pressure at the centre had decreased considerably, and it could be traced only as a ridge of high pressure extending from Lake Superior southward to Texas. After passing to the east of the Mississippi the pressure was increased during the slow easterly movement, and it was apparently re-enforced by the cold air from the Hudson Bay region, which transferred the region of greatest pressure to the upper Saint Lawrence valley, where it remained until the 30th, after which it disappeared owing to the advance of an area of low pressure from the Lake region.

VII.—Was observed on the Pacific coast to the west of California on the morning of the 30th, and after passing slowly to the northeastward, attended by increasing pressure, it was central over Oregon to the east of the Coast Range at the close of the month, at which period the barometer at Baker City, Oregon, was 30.60, while it was above 30.50 in north Dakota.

AREAS OF LOW PRESSURE.

Twelve areas of low pressure have been traced from the regular telegraphic weather reports during the month of October. Four of these disturbances reached the Atlantic coast within the limits of the United States with considerable energy, and four passed eastward over the lower Saint Lawrence valley. Six of these areas developed to the east of the Rocky Mountains within the limits of the United States, and four probably originated on the Pacific coast. While no disturbance passed eastward over the Rocky Mountains within the limits of the United States, five apparently passed eastward to the north of Montana; the direction of movement to the west of the Rocky Mountains being slightly to the north of east, while the movement was to the southeast until after the centre of depression passed to the east of the upper lake region, when the direction of movement was easterly. In two instances there was an abrupt change of direction of movement when the centre of disturbance reached the Atlantic coast.

I.—This disturbance has been partially described in the preceding REVIEW. At the opening of the month it was a well-defined storm, central north of Lake Huron. Strong winds prevailed in the Lake region, and the winds increased in force on the Atlantic coast, becoming dangerous on the New England coast during the 1st. The centre passed to the

lower Saint Lawrence valley where it was central on the morning of the 7th, where this storm apparently developed its greatest energy. It disappeared to the east of the Maritime Provinces during the night of the 7th, followed by westerly gales over the Gulf of Saint Lawrence.

II.—This depression was at no time central within the limits of the United States. An area of low pressure was north of Idaho on the 1st, and the succeeding reports from the 1st to the 4th show that this disturbance moved directly eastward north of and near the boundary line of the United States until the centre of disturbance reached the Saint Lawrence Valley, when it passed eastward over northern New England as a disturbance of slight energy and attended by increasing pressure at the centre. During its easterly movement it was attended by no marked change in the weather conditions, only light showers were reported at the more northerly stations, but winds were strong at lake stations, ranging from twenty-five to thirty-eight miles per hour when the centre of disturbance was north of the lower lake region, attaining a maximum velocity of thirty-six miles per hour on Lake Erie, twenty-eight miles per hour on Lakes Huron and Ontario, and thirty-eight miles per hour on Lake Michigan.

III.—This disturbance was first observed north of Montana on the 3d. It passed quickly eastward to Manitoba and thence southward to the upper lake region, where it was central on the 4th, bounded by an isobar of 30.01. Small areas of high pressure covered the lower lake region and the upper Missouri valley. By the morning of the 5th the decrease of pressure at the centre, and the advance of a high area from the west, had resulted in a great increase of energy of this storm over the Lake region. Although it was attended by very little rain or snow, the winds were strong from the west as the centre passed to the southeast of the lower lake region, when the winds shifted to the north; light snow occurred in the lower lake region on the 6th, and general rains occurred on the Atlantic coast, the precipitation being heavy along the New England coast near the centre of disturbance. In passing over southern New England the pressure decreased rapidly, and it fell to 29.50 at Nantucket, Mass., during the 7th. The barometric gradient at this time was considerable both to the northeast and to the west, and dangerous gales occurred along the coast from Hatteras, N. C., northward to the Maritime Provinces. The centre of disturbance passed rapidly from southern New England northward to Maine, and thence to the lower Saint Lawrence valley, where it was last marked as central on the morning of the 8th, although the pressure remained relatively low in that region until after the 11th.

IV.—This storm approached from the north Pacific and was attended by heavy rains along the Pacific coast as far south as central California on the 7th. It passed to the east of the coast line near Portland, Oregon, during the 7th, the rains extending to the east as far as the Rocky Mountain stations during the passage of this depression over the Rocky Mountain districts. It was well defined when central north of Montana and to the east of the Rocky Mountains on the 9th and north of Dakota on the 10th, after which it was not possible to trace its movements from the telegraphic reports.

V.—This area of low pressure developed in the upper Missippi valley during the 11th, and it was preceded by a trough of low pressure which extended to the southwest of the Rio Grande Valley during the 10th, and it was apparently a portion of the area of low pressure previously described as number iv. This storm moved rapidly eastward to the middle Atlantic states, with increasing energy during the movement, and attended by general rains throughout the Northern States. These rains apparently resulted from the continued cold northeasterly winds caused by an extended area of high pressure which covered the territory to the north. After reaching the Atlantic states this storm was apparently retarded, and it developed great energy, causing dangerous gales, especially on the south New England coast, where the maximum velocity reached seventy-six miles from the northeast on the 14th. These dangerous gales continued on the coast as far south as Hatteras, N. C., until the 16th. This storm continued its easterly movement after leaving the Atlantic coast, although marine reports indicate that it was somewhat retarded immediately after leaving the coast line. A continuation of the description of this storm is given under "North Atlantic storms."

VI.—This storm, although not attended by any unusual disturbance within the limits of the United States, is interesting from the fact that it probably originated in southern California, and after passing northeastward over the plateau regions between the 12th and the 15th, it crossed the Rocky Mountains, moving far to the north of Montana and Dakota, and then slowly eastward, its movement being traced from the regular telegraphic reports to the lower Saint Lawrence valley, where it was central on the morning of the 18th. The passage of this storm over the Rocky Mountain region was attended by general rains from Arizona and southern California northward to the British Possessions, and a decided fall in temperature and light frosts in Oregon on the 15th and 16th. Its course east of the Rocky Mountains is only approximately given, owing to the distance of the centre of disturbance from the stations of observation.

VII.—This storm developed in north Dakota on the 18th, where it was central as a feeble disturbance on the morning of that day. It first moved southeasterly to southern Minnesota, and then easterly over Lake Superior to the lower Saint Lawrence valley, where it was central on the morning of the 20th as a disturbance of considerable energy, the barometric gradient being considerable both to the southeast and southwest, the barometer at Father Point, Quebec, being 29.58, while it was 30.16 at Sydney, C. B. I., and 30.10 at Rockliffe, Ont. It probably passed to the northeast of the Maritime Provinces during the 20th, attended by dangerous gales, as the afternoon reports from Anticosti Island, Gulf of Saint Lawrence, indicated a maximum velocity of forty miles per hour from the southwest, and at Block Island, R. I., a current velocity of thirty-two miles per hour from the southwest.

VIII.—This storm developed on the eastern slope of the Rocky Mountains, it being first traced as central in northern Texas on the afternoon of the 21st. The pressure was unusually high from Nova Scotia westward to Montana, and an area of low pressure of considerable energy, attended by rains, extended over the Pacific coast districts. The storm central in Texas moved eastward, extending in an east and west direction during the 22d, passing over the Gulf States to the south of the area of high pressure above referred to which moved eastward with about the same velocity, and when the storm passed off the south Atlantic coast on the 24th, the area of high pressure was central over New England and it extended southwestward to the Gulf States. The northerly gales, which occurred at Atlantic coast stations immediately after this storm passed to the east of the coast line, indicated a great increase in energy after the storm centre passed eastward of the coast line. The 8 a. m. report of the 24th from Hatteras, N. C., showed a maximum velocity of seventy-six miles per hour from the north, with a current velocity of fifty-six miles per hour, the barometer reading 29.78, and at the same report a maximum velocity of twenty-four miles per hour was reported from Sandy Hook, N. J., and Block Island, R. I., the wind reaching forty-eight miles per hour at Block Island, R. I., during the 24th. This storm also passed beyond the limits of the coast, and has been further traced and described as north Atlantic storm number 7.

IX.—This disturbance developed in the upper Missouri valley, within the limits of the stations of observation. It was central in Montana on the 23d, and it followed the general course of the Missouri River during the succeeding twenty-four hours, reaching north Missouri on the afternoon of the 24th, when the disturbance had assumed the form of a barometric trough covering the central valleys. It moved directly eastward during the first twelve hours of the 25th, attended by general rains from the Gulf coast northward over the Mis-

sissippi Valley and Lake region, after which it passed south over the Ohio Valley and Tennessee to central Georgia, from which point it moved north, following the general direction of the coast line from Georgia to Massachusetts. The northeasterly movement of this storm was attended by heavy rains and dangerous gales along the coast. The pressure decreased at the centre of disturbance during its passage over the south and middle Atlantic states, and the storm apparently attained its maximum energy while passing from Virginia to New York. After reaching New England its course apparently changed to the east, and it disappeared on the 29th.

X.—Was central north of Washington on the 27th and moved directly eastward during the 28th and 29th, reaching Manitoba on the latter date, where it disappeared, unattended by any marked change in weather conditions within the limits of the United States.

XI.—This storm apparently developed on the south and east slopes of the Rocky Mountains, and was probably central in east New Mexico on the 27th. It remained almost stationary in this region during the succeeding forty-eight hours, after which it moved slowly to the northeast, passing over the central Mississippi valley during the 30th, causing general rains over the winter wheat states, where rain was much needed, and doubtless improved the condition of that crop. This disturbance could not be traced farther than the southern portion of Michigan, where it was central on the morning of the 1st. The previous reports indicated that the barometric pressure was increasing at the centre, and no trace of this disturbance remained on the afternoon chart of the 31st.

XII.—As in the preceding case, this disturbance apparently developed in eastern New Mexico. It moved southeasterly towards the Texas coast, where it remained at the close of the month. The succeeding history of this storm will be given in the November REVIEW.

The following tables exhibit some of the principal facts regarding these low areas:

TABLE I.

No.	First observed.			Last observed.		Duration.	Velocity per hr.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	Days.	Miles.			Inches.
I.....	1	48	76	49	63	1.5	20.0	1	Father Point, Quebec ..	29.38
II.....	1	50	116	47	69	3.0	33.0	1	Swift Current, N. W. T.	29.52
III.....	3	51	111	51	67	4.5	28.0	7	Nantucket, Mass	29.50
IV.....	7	46	126	53	101	3.0	20.0	7	Portland, Oregon	29.50
V.....	11	43	90	39	70	1.5	33.0	12	Baltimore, Md	29.84
VI.....	12	37	121	52	60	5.5	28.0	18	Anticosti Isl., G. of St. L.	29.60
VII.....	18	50	102	50	65	2.0	42.0	20	Father Point, Quebec ..	29.58
VIII.....	21	36	100	35	73	2.0	40.0	21	Fort Elliott, Tex.....	29.80
IX.....	23	47	107	43	71	5.0	24.0	27	Harrisburg, Pa	29.52
X.....	27	52	121	54	95	2.5	22.0	27	Calgary, N. W. T	29.34
XI.....	27	35	104	42	84	4.0	14.0	28,'9	Fort Elliott, Tex	29.58
XII.....	30	34	105	30	99	1.0	25.0	30	Fort Stanton, N. Mex ..	29.56
Mean.	....	44	107	45	76	3.0	27.4	....	.....	29.56

TABLE II.

Number.	Maximum abnormal fall in pressure in twelve hours.			Maximum abnormal rise in temperature in twelve hours.			Maximum wind velocity.		
	Amount.	Station.	Date.	Amount.	Station.	Date.	Miles per hour.	Direction.	Date.
	Inch.			°					
I.....	.34	Yarmouth, N.S.....	1	18	Chatham, N. B	1	36	sw. nw.	*
II.....	.38	Qu'Appelle, N. W. T .	1	26	Bismarck, Dak.....	1	56	w.	1
III...	.38	Qu'Appelle, N.W.T..	3	23	La Crosse, Wis.....	4	48	e.	7
IV...	.34	Calgary, N. W. T	7	26	Fort Buford, Dak .. Bismarck, Dak.....	7 8	48	w.	7
V....	.18	Washington, D. C....	12	22	La Crosse, Wis.....	11	76	ne.	14
VI...	.30	Anticosti I., G. St. L.	18	20	Minnedosa, N. W. T.	14	38	s.	14
VII..	.44	Rockliffe, Ont	19	26	Sioux City, Iowa	18	40	nw.	20
VIII..	.22	Santa Fé, N. Mex	21	14	Fort Elliott, Tex....	21	76	n.	24
IX...	.36	Wichita, Kans ..... Block Island, R. I..	24 27	15	Wilmington, N. C...	26	52	e.	29
X....	.40	Calgary, N. W. T	27	18	Ft. Assiniboine, Mont	27	40	se.	27
XI...	.26	Fort Elliott, Tex....	27	16	Louisville, Ky	30	48	nw.	28
XII..	.28	El Paso, Tex	30	15	Little Rock, Ark....	31	38	se.	31

*1st to 3d.

NORTH ATLANTIC STORMS FOR OCTOBER, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during October, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Nine depressions have been traced for October, 1889, the average number traced for the corresponding month of the last six years being 12.7. The greatest number of depressions traced for October was sixteen, in 1887, and the least number was seven, in 1883. Of the depressions traced for the current month three advanced eastward over, or north of, Newfoundland; three moved eastward from the coast south of New England; one advanced northeastward from the vicinity of western Cuba; one passed northwest from the Windward Islands, and recurved to the northeast near Bermuda; and one apparently originated west of the British Isles. Over the western portion of the ocean severe storms occurred on the 5th, when heavy gales were encountered north and northeast of Bermuda, attending the passage of the depression which had advanced from the Windward Islands; from the 13th to 16th, inclusive, gales of hurricane force were occasioned by a depression which pursued an irregular course off the middle Atlantic coast; and on the 23d and 24th storms of great violence attended a depression which passed off the south Atlantic coast during the 23d. The severest storms of the month over mid-ocean occurred on the 16–17th, when pressure falling below 29.00 (737), and strong to whole gales, attaining hurricane force on the 16th, were reported. Over and near the British Isles the barometer fell rapidly until the 7th, when the readings were below 28.70 (729) over Scotland. On this date a terrific gale prevailed throughout the British Isles. Many shipwrecks were reported and the coasts were strewn with wreckage. In the northern portions of England and Ireland many houses were demolished and numerous trees uprooted. During the 8th there was a decided increase in pressure over Great Britain, followed on the 9th by a marked decrease to below 28.80 (732), after which latter date the barometer continued relatively high until the 18th, when, under the influence of a storm advancing eastward over the Atlantic, there was a decided fall in pressure until the 20th, after which there was a gradual increase until the 24th, when the barometer was above 30.10 (764). On the 29th, 30th, and 31st, a depression over the ocean to the west and northwest caused south to west gales and low pressure over the British Isles. Reports at hand will not admit of definitely locating the tracks of the depressions that occasioned the severe storms over the British Isles during the first decade of the month; they seem to indicate, however, that on the 6th and 7th a depression passed north of Scotland, and on the 8th and 9th a depression moved east of south to the west coast of Scotland; was central north of Ireland on the 10th, and thence moving southeast disappeared east of Great Britain after the 12th.

The movements of areas of high pressure over the north Atlantic during the month were as follows: An extensive area of high pressure occupied the ocean between the tenth and sixty-fifth meridians and south of the fifteenth parallel on the 1st. This area remained over mid-ocean, alternately contracting and extending its longitudinal limits and gradually moving southward, until the 18th, when it disappeared south of the Azores. On this date an area of high pressure moved off the

middle Atlantic coast, and moved east and northeast until the 22d, when it occupied the ocean between the thirtieth and fiftieth meridians northward to the sixtieth parallel. On the date last named an area of high pressure appeared off the Atlantic coast south of New England and moved thence northeast to Newfoundland by the 24th and united with an area of high pressure over and near the Azores, and on the 25th and 26th the pressure was high from Newfoundland eastward over the British Isles. This area of high pressure contracted and moved southward to the Azores by the 29th, where it remained until the close of the month. During the 30th and 31st a small area of high pressure moved off the middle and south Atlantic coasts. Compared with the corresponding month of preceding years the storms over the north Atlantic during October, 1889, were deficient in number. The storms of the first decade over and near the British Isles, of the second and third decades off the coast of the United States, and of the second decade over mid-ocean, while failing to exhibit the extreme destructive violence of notable October storms of preceding years, were unusually severe, more especially those which prevailed over the British Isles from the 7th to 10th.

In October during the last sixteen years eight severe storms of tropical origin have advanced northward from the Caribbean Sea. In a majority of instances they have recurved over or near extreme western Cuba and the eastern part of the Gulf of Mexico and passed thence along or off the Atlantic sea-board to the vicinity of Newfoundland. In two instances only during this period, in 1886 and 1887, have storms of pronounced strength advanced from the Caribbean Sea over the Gulf of Mexico west of the ninetieth meridian in October. The following are brief descriptions of the more notable October storms of tropical origin traced and described in the MONTHLY WEATHER REVIEW for preceding years: 1873, 3d to 8th, a severe cyclone, first located south of western Cuba, recurved over the eastern Gulf; passed over Florida on the 6th, and continued its course northeastward off the Atlantic coast. Numerous disasters were caused at sea, and the settlement of Punta Rassa, Fla., was entirely destroyed, a hurricane velocity of ninety miles per hour being recorded at that place. Damage was also caused at Lake City, Saint Augustine, and Jacksonville, Fla., and at Charleston, S. C. 1876, 19th to 21st, storm first encountered by vessels in the Caribbean Sea south of Cuba. At Belen College Observatory, Havana, Cuba, the barometer reached its minimum, about 28.70 (729), at 11.45 a. m. of the 19th. The storm passed directly over Havana, and slightly to the east of Key West, Fla., where the lowest barometer, 28.73 (730), was noted at 8 p. m. of the 19th. The highest force of wind at Key West was at the rate of eighty-eight miles per hour at 8.45 p. m. of the 19th. The storm moved off the east-central coast of Florida on the morning of the 20th, and thence passed northeastward. 1877, September 21st to October 5th, storm moved from the Barbadoes westward over the Caribbean Sea and recurved between Cuba and Yucatan into the Gulf of Mexico, and by the night of October 2d had reached the coast of Florida near Saint Marks. Moving thence northeast the storm passed off the middle Atlantic coast, and was central south of Newfoundland on the night of the 5th. This storm caused immense damage to property and considerable loss of life in the West Indies, and during its passage over the continent was attended by very severe storms and destructive tides. 1878, 21st to 24th, storm moved from south of Cuba northward to the North Carolina coast, and thence to south-central New York, where it recurved eastward and passed over New England and south of Nova Scotia. A hurricane prevailed at Havana, Cuba, on the night of the 21st, with heavy rain, doing much damage to buildings and shipping. At Key West, Fla., the barometer fell to 29.53 (750), and the highest wind force was fifty-four miles per hour. At Kitty Hawk, N. C., the wind reached a velocity of eighty-eight miles per hour, and the barometer fell to 29.06 (738) on the 22d. The storm's vortex passed almost directly over Washington, D. C., where the lowest barometer, 28.80 (732), occurred about 7.15 a. m. of the 23d. The storm moderated somewhat in severity after recurving eastward over New England, but throughout its entire course over the continent was exceptionally severe, and ranks as one of the most destructive storms on record for the Atlantic coast. 1882, 8th to 10th, storm moved from south of Cuba to the east Gulf coast. Great loss of life and damage to property was reported in Cuba. The cyclone lost much of its energy after leaving Cuba. 1886, 8th to 12th, a very destructive storm moved from south of Cuba to the west Gulf coast, and dissipated over the west Gulf states. 1887, on the 11th a storm was central over the central Caribbean Sea, whence it moved to the west Gulf by the 17th; recurved to the Gulf coast near New Orleans, La.; thence moved to the south Atlantic states, skirted the middle Atlantic and New England coasts, and reached the Saint Lawrence Valley the night of the 23d, attended throughout by gales of great violence and general and heavy rain.

The following are brief descriptions of the depressions traced for October, 1889:

1.—This depression was central over or near the Windward Islands on the 1st and 2d, whence it moved northwest to about N. 28°, W. 68° by the 4th, where it recurved and passed west and north of Bermuda to the thirty-fifth parallel by the 5th, and on the morning of the 6th was central off the southern edge of the Banks of Newfoundland, after which it apparently dissipated. This depression exhibited greatest energy on the 5th, when strong to whole gales were encountered north and northeast of Bermuda.

2.—This depression was a continuation of low area i which passed over the Gulf of Saint Lawrence on the 2d, with pressure below 29.40 (747). By the 3d the centre of depression had moved northeast of Labrador beyond the region of observation.

3.—The presence of a barometric depression near western Cuba was indicated by reports of the 4th and 5th, and by the 6th the centre of disturbance had apparently advanced northeastward to north of the Bahamas, whence it moved rapidly northeast to the fortieth parallel by the 7th, and thence passed northward to the lower Saint Lawrence valley by the 8th. This depression augmented in energy until the 7th, when pressure below 29.60 (752) and fresh to strong gales were reported off the middle Atlantic and New England coasts. The northerly course of the storm after the morning of the 7th was apparently due to high barometric pressure to the east and northeast, the barometer over Newfoundland ranging to 30.47 (774) at Saint John's, giving a gradient of about .90 of an inch in about nine hundred miles on the morning of that date.

4.—This depression was apparently a continuation of low area iii which was central over the Saint Lawrence Valley and the Maritime Provinces from the 8th to 10th, inclusive, where it was apparently held by an area of high pressure overlying Newfoundland and the ocean to the eastward. With the giving away of this area of high pressure to the southeast and south the depression advanced eastward over northern Newfoundland during the 11th, whence it is traced irregularly eastward to the north of the British Isles, where it disappeared during the 16th, attended throughout by fresh to strong gales.

5.—This depression was a continuation of low area v, and on the 14th was central in about N. 39°, W. 72°, with pressure below 29.70 (754) and moderate to fresh gales. On this date a depression of small energy was central east of Bermuda. By the morning of the 15th depression number 5 had moved south to the thirty-sixth parallel and had apparently united with the depression central east of Bermuda on the preceding date, which had moved westward. On the 15th a marked decrease in central pressure was shown and gales of hurricane force were reported off the middle Atlantic coast. During the next twenty-four hours the centre of disturbance moved southward to the thirty-fourth parallel, with pressure below 29.50 (749) and gales of hurricane force, after which it moved rapidly east-northeast and probably united after the 19th with an extensive area of low pressure central over the British Isles.

6.—This depression moved eastward from north of New-

foundland, where it was central on the 15th, to the British Isles by the 19th, in which region it continued until after the 22d. The depression was attended by severe storms, and on the 17th pressure falling below 29.00 (737) was reported.

7.—This depression was a continuation of low area viii which passed off the south Atlantic coast during the 23d. On the 24th the storm was central about midway between Bermuda and the south Atlantic coast, with central pressure below 29.70 (754) and fresh to strong gales. Passing thence northeastward, attended by strong gales, the depression dissipated over or near the Banks of Newfoundland after the 26th.

8.—This depression was a continuation of low area ix which advanced eastward from the New England coast during the 28th, and passed thence eastward to the sixty-fifth meridian by the 29th, whence it moved northward to the vicinity of the west coast of Newfoundland, where it remained as an area of low pressure to the close of the month.

9.—This depression apparently developed west of the British Isles, and on the 28th was central in about N. 55°, W. 24°, with pressure below 29.60 (752) and moderate to fresh gales. Moving slightly northwest by the 29th the storm passed northeastward during the 30th, and by the 31st had disappeared north of the region of observation, with a decided decrease in pressure and a marked increase in energy.

OCEAN ICE IN OCTOBER.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for October, during the last seven years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
October, 1883	46 56	46 22	October, 1883	46 56	46 22
October, 1884	Off Cape	Race.	October, 1884	46 56	50 55
October, 1885	48 21	47 12	October, 1885	48 21	47 12
October, 1886	41 34	49 43	October, 1886	46 03	46 37
October, 1887	42 58	50 02	October, 1887	42 58	50 02
October, 1888	51 43	55 36	October, 1888	51 43	55 36
October, 1889	44 32	49 28	October, 1889	46 39	45 59

In October, 1889, the southernmost ice reported, a large iceberg observed on the 14th in the position given, was about two degrees south of the average southern limit, and the easternmost ice reported, a large iceberg, was over three degrees east of the average eastern limit of ice for the month. Ice was most frequently observed from Belle Isle eastward to the fifty-second meridian; it was also frequently encountered along the east and northeast edges of the Banks of Newfoundland. No ice was reported near the coast of Newfoundland south of the fiftieth parallel. Compared with the corresponding month of last six years the amount of Arctic ice reported for October, 1889, was largely in excess of the average quantity, and the region of its prevalence was considerably extended.

The following positions of icebergs and field ice reported are shown on chart i by ruled shading:

1st.—N. 47° 28′, W. 47° 00′, a medium sized berg; N. 46° 57′, W. 47° 24′, a large berg about one hundred and twenty feet high.

2d.—N. 46° 30′, W. 45° 59′, a large berg with pyramid bluff at each end.

3d.—N. 52° 18′, W. 53° 20′ to N. 52° 05′, W. 53° 56′, two large bergs; N. 46° 40′, W. 47° 04′, four lumps of ice.

4th.—N. 52° 19′, W. 52° 35′, a large berg; N. 47° 02′, W. 46° 11′, a large berg.

5th.—N. 50° 03′, W. 56° 40′, a large berg.

6th.—N. 45° 47′, W. 48° 41′, a large berg.

10th.—Point Amour to Cape Norman, several bergs; also off Belle Isle, several bergs.

11th.—Off Cape Norman, several small bergs; N. 52° 30′, W. 52° 30′, several large bergs from Belle Isle to this position.

12–13th.—N. 52° 20′, W. 52° 30′, a small berg; N. 52° 05′, W. 53° 46′, two medium sized bergs; in the straits of Belle Isle, a small berg.

14th.—N. 44° 32′, W. 49° 28′, a large iceberg; N. 52° 50′, W. 52° 30′, two bergs; also five bergs, about twenty miles apart, between the above position and Belle Isle; off Greenley Island, small bergs.

15th.—N. 52° 40′, W. 51° 30′, one large berg, and a quantity of small pieces.

16th.—N. 45° 14′, W. 49° 08′, a berg; N. 52° 39′, W. 52° 45′, a large berg; off Cape Onion, N. F., a large berg; N. 52° 50′, W. 52° 14′; two large bergs.

17th.—From N. 51° 58′, W. 55° to Point Amour, several large and small bergs.

17–19th.—N. 52° 24′, W. 52° 51′, a small berg; N. 51° 56′, W. 54° 36′, a large berg; two bergs in Straits of Belle Isle; one off Cape Banco, the other off Cape Norman.

21st.—N. 51° 56′, W. 53° 42′, one large berg; eight miles east of Belle Isle, very large berg, also several smaller ones.

22d.—N. 48° 05′, W. 50° 07′; one irregular, oblong-shaped berg, about one hundred yards long and forty feet high.

23d.—Ninety miles east of Belle Isle, one large berg; also several small bergs; N. 46° 44′, W. 47° 21′, one berg, four hundred feet long and one hundred feet high.

24th.—N. 47° 46′, W. 48° 12′, one large berg.

26th.—N. 52° 25′, W. 52° 00′, one medium sized berg; N 52° 00′, W. 54° 30′, one berg.

29th.—Off Point Amour, two small bergs; also off Belle Isle three small bergs.

FOG IN OCTOBER.

The following are limits of fog-areas on the north Atlantic Ocean, west of the fortieth meridian, for October, 1889, as reported by shipmasters:

Date.	Entered.		Cleared.		Date.	Entered.		Cleared.	
	Lat. N.	Lon. W.	Lat. N.	Lon. W.		Lat. N.	Lon. W.	Lat. N.	Lon. W.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
3	43 42	49 24	43 51	48 46	11	44 51	49 33	45 01	48 34
3	43 19	51 16	43 24	50 44	15–16	44 00	49 10	45 05	47 05
3	46 31	45 33	45 15	48 33	15–16	43 38	53 51	43 55	51 52
4	45 57	52 51	45 12	54 30	19	47 44	45 00	46 55	47 55
4–5	44 45	52 35	46 15	46 43	21	41 36	64 12	41 34	64 24
5	47 49	44 45	46 09	49 24	22	45 02	50 46	44 54	51 26
5	44 05	49 00	43 54	50 02	22	48 02	48 00	47 06	49 06
5	44 16	48 38	44 27	47 59	23	46 29	47 10	46 22	47 28
5	47 55	47 32	48 09	48 52	25–26	42 06	65 12	41 19	67 15
8	45 38	50 42	44 46	54 02	26	45 32	58 44	45 04	61 00
9	46 25	47 00	45 20	51 54	26	42 49	62 24	43 03	64 29
9	44 39	55 46	43 27	59 23	26	41 32	65 58	41 20	66 29
9–10	47 20	43 04	45 00	50 22	26	41 40	68 00	40 56	67 30
9–10	47 27	42 54	46 09	48 44	26–27	46 38	52 17	44 13	55 55
10	47 34	46 20	47 18	47 02	26–27	47 38	52 27	46 21	54 15
10	43 47	50 33	44 14	48 21	27	47 01	44 15	46 44	45 33
11	45 35	47 19	45 19	48 37	28–29	42 52	66 37	43 00	67 00
11	51 34	56 30	off Cape Norman.		30	43 23	59 55	43 18	51 20

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on fifteen dates; between the fifty-fifth and sixty-fifth meridians on four dates; and west of the sixty-fifth meridian on four dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near Newfoundland were three in excess of the average; between the fifty-fifth and sixty-fifth meridians one less than the average; and west of the sixty-fifth meridian one more than the average. Over and near the Grand Banks fog was reported with the advance of areas of low pressure from the westward, except on the 22d and 23d, when variable winds and rain prevailed in that region. Between the fifty-fifth and sixty-fifth meridians fog was reported on the 9th, with an area of low pressure central in the Saint Lawrence Valley; on the 21st with variable winds and rain; on the 26th with an area of low pressure central southeast of Nova Scotia, and another on the south Atlantic coast; and on the 27th with an area of low pressure moving northeastward along the south and middle Atlantic coasts. West of the sixty-fifth meridian fog was reported on the 25th with an area of low pressure central north of Bermuda; on the 26th with an area of low pressure central southeast of Nova Scotia,

and another area of low pressure on the south Atlantic coast; on the 28th with an area of low pressure central over New England; and on the 29th with an area of low pressure central southeast of Nova Scotia.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for October, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

In October, 1889, the mean temperature was highest in extreme southeastern California and southwestern Arizona, the lower Rio Grande valley, and extreme southern Florida, where it was above 75°, the highest mean reading, 84°.5, being reported at Fort Brown, Tex. The mean values were above 65° south of a line traced irregularly westward from the Georgia coast to southeastern Arizona, thence northwestward over the San Joaquin Valley, and thence east of south to the California coast near Los Angeles. The lowest mean temperature was reported north of a line traced from Manitoba east-southeast to west-central Quebec, and in central Colorado, where it fell below 35°, the lowest means reported being 28°.8, at Dolly Varden Mines, Colo., and 33°.2, at Atlantic, Mich. The mean readings were generally below 50° north of a line traced from the southern coast of New England southwestward to western Virginia, thence northwestward to central Dakota, thence west-southwest to south-central New Mexico, and thence irregularly northwestward to Puget Sound, over western portions of the middle plateau region, and in south-central Oregon.

The reports of regular stations of the Signal Service show that the mean temperature for October, 1889, was below the normal east of the Rocky Mountains, except in Dakota, in Texas west of the ninety-eighth meridian, and at coast stations in New Brunswick and southeastern Nova Scotia. In the Rocky Mountain and plateau regions and on the Pacific coast the month was warmer than the average October. The greatest departures below the normal temperature occurred from the middle Atlantic and North Carolina coasts northward over the Lake region, where they exceeded 5°, and the most marked departures above the normal were noted in the northern plateau region and on the northeastern slope of the Rocky Mountains, where they were more than 5°. Considered by districts the average departure below the normal temperature was 6°.3 in the lower lake region; 5°.3 in the middle Atlantic states; 4°.9 in the Ohio Valley and Tennessee; 4°.6 in the upper lake region; 4°.0 in the south Atlantic states and the upper Mississippi valley; 3°.3 in New England; 3°.2 in the Florida Peninsula and the east Gulf states; 1°.4 in the west Gulf states; and 0°.4 in the Missouri Valley. The average departure above the normal temperature was 6°.1 in the northern plateau region; 4°.4 on the northeastern slope of the Rocky Mountains; 3°.4 on the south Pacific coast; 3°.3 on the north Pacific coast; 2°.4 in the extreme northwest and the middle plateau region; 1°.8 in the southern plateau region; 0°.8 on the southeastern slope of the Rocky Mountains; and 0°.6 on the middle Pacific coast. On the middle-eastern slope of the Rocky Mountains and in the Rio Grande Valley the mean temperature averaged normal.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.	°	Below normal.	°
Fort Maginnis, Mont.	7.2	Erie, Pa.	7.8
Medicine Hat, N. W. T.	7.0	Rochester, N. Y.	7.1
Spokane Falls, Wash.	6.4	Cape Henry, Va.	6.6
Portland, Oregon	4.2	Cincinnati, Ohio	6.4
San Diego, Cal.	3.4	Saugeen, Ont.	6.6

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for October, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for October, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Oct.	(2) Length of record.	(3) Mean for Oct., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Oct.			
						Highest.	Year.	Lowest.	Year.
		°	Years	°	°	°		°	
Arkansas.									
Lead Hill	Boone	60.2	8	59.2	−1.0	64.0	1881	56.0	1885
California.									
Sacramento	Sacramento	61.9	36	55.6	−6.3	69.9	1875	54.8	1886
Colorado.									
Fort Lyon	Bent	58.0	19	53.8	−4.2	57.8	1871	42.2	1867
Connecticut.									
Middletown	Middlesex	50.1	22	47.2	−2.9	54.7	1871	45.5	1888
Florida.									
Merritt's Island	Brevard	74.9	5	73.8	−1.1	76.2	1884	73.1	1885
Georgia.									
Forsyth	Monroe	67.4	15	65.7	−1.7	75.4	1884	61.7	1885
Illinois.									
Peoria	Peoria	54.0	30	50.2	−3.8	62.7	1879	45.2	1869
Riley	McHenry	47.5	33	45.7	−1.8	56.0	1879	38.6	1869
Indiana.									
Vevay	Switzerland	56.1	23	51.6	−4.5	65.0	1879	43.2	1869
Iowa.									
Cresco	Howard	46.0	17	43.0	−3.0	54.1	1879	41.2	1873
Monticello	Jones	49.1	34	44.7	−4.4	58.0	1879	36.0	1873
Logan	Harrison	52.6	15	52.3	−0.3	60.7	1879	48.5	1875
Kansas.									
Lawrence	Douglas	54.4	21	53.6	−0.8	60.5	1879	44.0	1869
Wellington	Sumner	56.6	10	.....	.....	60.6	1879, '84	53.3	1880, '83
Louisiana.									
Grand Coteau	Saint Landry	68.8	8	67.6	−1.2	75.5	1883	64.8	1885
Maine.									
Gardiner	Kennebec	47.2	49	.....	.....	52.4	1879	43.1	1869
Maryland.									
Cumberland	Allegany	50.8	30	49.5	−1.3	60.0	1881	41.8	1869
Massachusetts.									
Amherst	Hampshire	48.8	53	48.2	−0.6	56.0	1879	42.8	1841
Newburyport	Essex	49.6	11	46.9	−2.7	55.0	1879	45.1	1888
Somerset	Bristol	52.6	17	50.9	−1.7	58.1	1879	47.6	1874
Michigan.									
Kalamazoo	Kalamazoo	50.9	13	46.8	−3.2	54.5	1879	45.7	1887
Thornville	Lapeer	50.8	12	45.6	−5.2	58.5	1879	45.6	1889
Minnesota.									
Minneapolis	Hennepin	45.4	24	43.8	−1.6	56.1	1879	36.5	1869
Montana.									
Fort Shaw	Lewis & Clarke	48.9	20	51.2	+2.3	58.1	1879	34.6	1881
New Hampshire.									
Hanover	Grafton	44.9	54	42.4	−2.5	52.4	1879	38.6	1836
New Jersey.									
Moorestown	Burlington	53.5	26	49.8	−3.7	59.5	1879	48.6	1888
South Orange	Essex	53.0	19	48.4	−4.6	58.1	1879	47.2	1871
New York.									
Cooperstown	Otsego	46.5	35	41.6	−4.9	53.3	1879	40.7	1865
Palermo	Oswego	47.2	35	41.8	−5.4	53.9	1879	41.8	1889
North Carolina.									
Lenoir	Caldwell	56.8	18	54.0	−2.8	66.4	1878	48.0	1874
Ohio.									
N'th Lewisburgh	Champaign	52.0	57	48.6	−3.4	58.0	1852	43.0	1869
Wauseon	Fulton	50.7	19	45.2	−5.5	59.0	1879	45.2	1889
Oregon.									
Albany	Linn	51.9	9	54.4	+2.5	56.3	1885	48.7	1881
Eola	Polk	51.4	18	54.9	+3.5	59.7	1876	45.4	1873
Pennsylvania.									
Dyberry	Wayne	46.7	21	41.6	−5.1	53.4	1879	41.2	1869
Grampian Hills	Clearfield	47.8	25	45.1	−2.7	56.4	1879	39.2	1869
South Carolina.									
Statesburgh	Sumter	64.0	8	60.4	−3.6	69.0	1881	59.8	1885, '88

Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of Oct.	(2) Length of record.	(3) Mean for Oct., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Oct.			
						Highest.	Year.	Lowest.	Year.
Tennessee.		°	*Years*	°	°	°		°	
Austin	Wilson	59.6	20	56.7	−2.9	70.2	1879	52.5	1888
Milan	Gibson	56.2	6	56.0	−0.2	62.4	1883	50.5	1884
Texas.									
New Ulm	Austin	69.6	16	70.5	+0.9	73.9	1881	65.8	1873
Vermont.									
Strafford	Orange	47.0	16	43.6	−3.4	52.8	1879	40.6	1888
Virginia.									
Birdsnest	Northampt'n	61.2	21	56.6	−4.6	69.2	1881	54.5	1869
Wytheville	Wythe	50.4	24	.....	.....	59.0	1879	46.3	1888
Wisconsin.									
Madison	Dane	48.0	20	46.2	−1.8	59.4	1864	39.8	1869
Washington.									
Fort Townsend	Jefferson	50.5	13	52.5	+2.0	54.6	1875	48.6	1879

The above table shows that at Thornville, Mich., twelve years record, the mean temperature for the current month, 45°.6, was 0°.2 lower than previously reported for October; the lowest previous mean reading for this month being 45°.8, in 1887. At Palermo, N. Y., thirty-five years record, the mean, 41°.8, was 0.1 below the lowest October mean of preceding years, noted in 1887; and at Wauseon, Ohio, nineteen years record, the lowest previous mean for October, 46°.0, noted in 1875 and 1888, was 0°.8 higher than the mean for the current month. Unusually high mean temperatures are not shown by this table.

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported at regular stations of the Signal Service was noted in Arizona, where it rose to 106° at Forts McDowell and Yuma. The maximum readings were 90° or above from southwestern Arizona northwestward over the valleys of the San Joaquin and Sacramento rivers, from the Rio Grande Valley northward to central Kansas, in extreme southern Louisiana, and at Jacksonville, Fla. The reports of United States Army post surgeons and state weather service and voluntary observers show maximum temperature of 100°, or above, as follows: Casa Grande, Ariz., 109°; Fort Lowell and Signal, Ariz., 101°; Fort Mojave, Ariz., 107°; Gila Bend, Ariz., 104°; New River and Phœnix, Ariz., 100°; Texas Hill, Ariz., 110°; Athlone and Delano, Cal., 101°; Cactus, Cal., 115°; Colton, Cal., 102°; Elmira, Goshen, and Needles, Cal., 100°; Fresno, Cal., 106°; Indio, Cal., 118°; Mammoth Tank, Cal., 108°; Mojave, Cal., 116°; Salton, Cal., 109°; Sanger Junction and Tulare, Cal., 102°; Seven Palms, Cal., 110°; Volcano Springs, Cal., 113°; Magnolia, Colo., 100°; Cameron, La., 100°; and San Antonio, Tex., 100°. The following are unusually high temperatures noted at regular stations of the Signal Service for October of previous years: 89° at Boston, Mass., in 1881; 92° at Washington, D. C., in 1879; 104° at Rio Grande City, Tex., in 1877; 94° at Knoxville, Tenn., in 1884; 87° at Rochester, N. Y., Cleveland, Ohio, and Marquette, Mich., 95° at Fort Buford, Dak., and 90° at Saint Louis, Mo., in 1879; 90° at Topeka, Kans., and Crete, Nebr., in 1887; 89° at North Platte, Nebr., in 1879; 92° at Concordia, Kans., in 1887; 93° at Abilene, Tex., in 1885; 108° at Yuma, Ariz., in 1887; 93° at Ashland, Oregon, in 1885; and 102° at Los Angeles, Cal., in 1885. At the following-named stations of the Signal Service the maximum temperature was as high or higher than previously reported for October: New Orleans, La., nineteen years record, 90°, the same as maximum of 1884; Fort Assinniboine, Mont., ten years record, 89°, 6° above maximum of 1884 and 1885; Fort Custer, Mont., eleven years record, 89°, 2° above maximum of 1879; Fort Maginnis, Mont., eight years record, 87°, 4° above maximum of 1885; Helena, Mont., ten years record, 80°, 3° above maximum of 1885; Dodge City, Kans., sixteen years record, 94°, 2° above maximum of 1887; Fort Reno, Ind. T., seven years record, 91°, 3° above maximum of 1884; Fort Supply, Ind. T., seven years record, 96°, 6° above maximum of 1887; Fort Elliott, Tex., ten years record, 94°, 5° above maximum of 1887; Fort Sill, Ind. T., twelve years record, 94°, 3° above maximum of 1878 and 1884; Fort Apache, Ariz., eleven years record, 88°, the same as maximum of 1887; Fort McDowell, Ariz, six years record, 106°, 2° above maximum of 1885; Fort Verde, Ariz., thirteen years record, 96°, the same as maximum of 1887; Whipple Barracks (Prescott), Ariz., fourteen years record, 87°, 1° above maximum of 1881; Keeler, Cal., five years record, 91°, the same as maximum of 1887; Winnemucca, Nev., eleven years record, 87°, the same as maximum of 1887; Salt Lake City, Utah, sixteen years record, 86°, 1° above maximum of 1887; Montrose, Colo., five years record, 83°, the same as maximum of 1887; Boisé City, Idaho, thirteen years record, 91°, 4° above maximum of 1887; Spokane Falls, Wash., nine years record, 86°, 4°.5 above maximum of 1888; Olympia, Wash., twelve years record, 74°, the same as maximum of 1888; Tatoosh Island, Wash., seven years record, 65°, 1°.5 above maximum of 1883; Port Angeles, Wash., six years record, 64°, the same as maximum of 1885; San Francisco, Cal., nineteen years record, 87°, the same as maximum of 1887. The highest temperatures for October have been generally noted in New England and the middle Atlantic states in 1879 or 1884; in the south Atlantic, east and west Gulf states, and in the Ohio Valley and Tennessee in 1884; in the Rio Grande Valley in 1877; in the lower lake region in 1872 or 1879; in the middle-eastern and northeastern slope of the Rocky Mountains and the middle and northern plateau regions in 1889; on the north Pacific coast in 1885; and on the middle Pacific coast in 1887. In districts other than those named the periods were irregular.

In October, 1889, the maximum temperature was lowest in northeastern New England, and at stations in northern Michigan, where it fell below 60°, and the maximum readings were below 70° over northern New England, along the southern coast of New England, in northern and western New York, a greater part of Michigan, northern Wisconsin, and on the extreme north Pacific coast.

The lowest temperature reported by a regular station of the Signal Service was 9°, at Saint Vincent, Minn.; at Northfield, Vt., a reading of 12° was registered. The temperature fell below 30° north of a line traced from the Massachusetts coast southwestward to central Tennessee, thence northward to southeastern Wisconsin, thence west-southwest to east-central Arizona, thence northwestward to west-central Oregon, thence southeast to northern Utah, and thence northward over Montana to the British Possessions; at Fort Klamath, Oregon, a reading of 20° was reported. The highest minimum temperature was noted over southern Florida where it was above 65°, and the lowest temperature values were above 50° over the southern half of Florida, on the west Gulf coast, and on the Pacific coast south of San Francisco, Cal. The following are the lowest readings reported in the several states and territories where temperature of 32° or below was reported, as shown by reports of United States Army post surgeons and state weather service and voluntary observers: 27° at Double Springs, Ala.; 20° at Williams, Ariz., and Devall's Bluff, Ark.; 22° at Boca, Cal.; zero at Dolly Varden Mines, Colo.; −9° at Pike's Peak, Colo.; 18° at New Hartford, Conn.; 12° at New England City, Dak.; 32° at Kirkwood, Del.; 25° at Duck, Ga.; 5° at Soda Springs, Idaho; 18° at Mount Morris, Ill.; 17° at Richmond, Ind.; 30° at Fort Gibson, Ind. T.; 12° at Wesley, Iowa; 20° at Fremont, Kans.; 23° at Ashland, Ky.; 31° at Plaquemine, La.; 13° at Mayfield, Me.; 24° at Cumberland, Md.; 16° at Monson and Gilbertville, Mass.; 8° at Roscommon, Mich.; 28° at Corinth, Miss.; 23° at Steelville, Mo.; 11° at Camp Poplar River, Mont.; 11° at Ansley, Nebr.; 21° at Carson City, Nev.; 6° at Berlin Falls, N. H.; 23° at Hanover, N. J.; 17° at Coolidge, N. Mex.; 12° at Angelica and Saranac Lake, N. Y.; 20°? at Franklin, and 26° at Hot Springs, N. C.; 16° at Garrettsville, Lordstown, and Orangeville, Ohio; 20° at Jordan Valley, Oregon; 10° at Meadville, Pa.; 27° at Woonsocket, R. I.; 22° at Spartan-

burgh, S. C.; 26° at Hohenwald, Nunnelly, and Riddleton, Tenn.; 24° at Hartley, Tex.; 22° at Beaver, Utah; zero at Weatherford Centre, Vt.; 26° at Lexington, Va.; 22° at Seven Pines, W. Va.; 11° at Wausau, Wis., and Camp Pilot Butte, Wyo. At the following named Signal Service stations the temperature was as low or lower than previously reported for October: Portland, Me., eighteen years record, 26°, 2° below minimum of 1886; Fort Smith, Ark., eight years record, 31°, the same as minimum of 1886; Brownsville, Tex., fourteen years record, 49°, the same as minimum of 1879; Oswego, N. Y., nineteen years record, 24°, the same as minimum of 1887; Lava, N. Mex., five years record, 28°, the same as minimum of 1888; Fort McDowell, Ariz., six years record, 38°, the same as minimum of 1886. The lowest temperature previously reported for October was generally noted in the east Gulf states, Ohio Valley and Tennessee, upper and lower lake regions, upper Mississippi and Missouri valleys, extreme northwest, southeastern slope of the Rocky Mountains, and northern plateau region in 1887, in the southern plateau region in 1880, and on the middle Pacific coast in 1881. In districts other than those named the periods of occurrence were irregular.

LIMITS OF FREEZING WEATHER.

The southern and western limits of freezing weather are shown on chart iv by a line traced from the south coast of New England southwestward to central Tennessee, thence northwestward to south-central Illinois, thence west-southwest to extreme southwestern New Mexico, thence northwestward to west-central Oregon, whence it curves eastward over the valley of the Columbia River, and thence northwestward to Puget Sound.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred from Indian Territory northward over the Valley of the Red River of the North, in the upper Missouri valley, and over portions of the middle and southern plateau region, where they were more than 60°, whence they decreased eastward to less than 30° on the New England coast, southeastward to less than 30° on the Gulf coast, southwestward to less than 30° on the extreme south Pacific coast, and westward to 20° on the extreme north Pacific coast.

The following are some of the extreme monthly ranges:

Greatest.	°	Least.	°
Fort Buford, Dak	74.0	Tatoosh Island, Wash	20.0
Dodge City, Kans	66.0	Key West, Fla	21.0
Taylor's Ranch, Utah	65.0	Nantucket, Mass	27.0
Fort Assinniboine, Mont	68.0	San Diego, Cal	28.0
Saint Vincent, Minn	68.0	Galveston, Tex	29.0

FROST.

Heavy frost, damaging vegetation, was reported as far south as University, Miss., Raleigh, Mount Pleasant, and Monroe, N. C., and Statesburgh, S. C. on the 8th, and at Ashwood, Tenn., and Double Springs, Ala., on the 31st. Light frost was reported in extreme south-central Georgia on the 8th, 9th, and 15th; in extreme southern Alabama and Mississippi on the 8th; in extreme southern Louisiana on the 27th and 28th; in central Texas as far south as the thirtieth parallel on the 27th; in New Mexico as far south as Fort Stanton on the 18th and 23d, and Lava on the 30th; in Arizona as far south as Tucson on the 30th and 31st; in California as far south as Jolon on the 9th, and Keeler on the 26th; at Roseburgh, Oregon, on the 15th; in extreme south-central Oregon on the 12th, 28th, and 31st; in western Oregon generally on the 15th; and in northwestern Washington on the 15th and 16th. The occurrence of killing frost in the south Atlantic states was about one week earlier, and in northern Mississippi about two weeks earlier than the average date of first killing frost in those regions, while in northern Alabama and Tennessee it was seasonable. Compared with September, 1889, the southern limit of frost for the current month has extended southward nearly ten degrees on the Atlantic coast; from three to ten degrees in the east Gulf states and the Mississippi Valley; about two degrees in central Texas; remained about the same in New Mexico; about two degrees in Arizona; and about five degrees on the Pacific coast.

For October, 1889, frost was reported south of the fortieth parallel, and in the Pacific coast states, as follows: it was reported in the greatest number of states and territories, twenty-three, on the 9th and 16th; in twenty on the 8th and 17th; in seventeen on the 15th, 28th, and 29th; in sixteen on the 7th; in from nine to fifteen, inclusive, on the 3d, 5th, 6th, 10th, 14th, 18th, 19th, 23d to 27th, inclusive, 30th and 31st; in eight on the 11th and 20th; in from two to seven, inclusive, on the 1st, 2d, 4th, 12th, 13th, 21st, and 22d. There were no dates for which frost was not reported in two or more states or territories south of the fortieth parallel or on the Pacific coast.

Frost was reported on the greatest number of dates, twenty-six, in Pennsylvania; on twenty-three in Illinois and Ohio; nineteen in Nevada and Tennessee; eighteen in Indiana and Missouri; seventeen in Utah and West Virginia; from ten to fifteen, inclusive, in Alabama, Arizona, Colorado, Georgia, Kansas, Kentucky, Maryland, New Mexico, North Carolina, South Carolina, and Virginia; nine in Louisiana and Mississippi; seven in New Jersey; and from two to six, inclusive, in Arkansas, California, Delaware, District of Columbia, Indian Territory, Texas, and Washington. There were no states or territories south of the fortieth parallel or on the Pacific coast, except Florida, in which frost was not reported on two or more dates.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for October, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
	°	°	°	°	°
Boston, Mass	57.0	48.0	9.0	51.3	48.5
Canby, Fort, Wash	60.5	55.3	5.2	56.9	56.1
Cedar Keys, Fla	84.3	61.0	23.3	74.4	68.8
Charleston, S. C	76.9	64.0	12.9	69.9	64.7
Eastport, Me	52.2	48.7	3.5	50.5	45.8
Galveston, Tex	77.0	70.0	7.0	73.6	72.2
Key West, Fla	84.9	74.0	10.9	79.7	76.8
Nantucket, Mass	63.0	48.5	14.5	55.7	52.0
New York, N. Y	61.9	45.8	16.1	53.9	52.0
Portland, Oregon	63.9	54.0	9.9	57.5	57.2

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for October, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The heaviest rainfall of the month fell in north-central Cali-

fornia, in Siskiyou and Shasta counties, where, within a limited area, it exceeded twenty-five inches, the greatest amount, 28.57 inches, being reported at Sims, Shasta Co. The rainfall on the Pacific coast exceeded ten inches along the immediate coast of Oregon, and from the California coast north of the mouth of the Klamath River southeastward over California to about the thirty-ninth parallel; it also amounted to ten inches on the California coast between the thirty-fourth and thirty-fifth parallels. In the plateau regions the precipitation was heaviest in north-central Utah, where it exceeded three inches, and least over southeastern California and southwestern Arizona, where it was generally below one-half inch. On the eastern slope of the Rocky Mountains the precipitation exceeded four inches in western Indian Territory, and in extreme southeastern Wyoming, while within an area extending from north-central Montana northward into the British Possessions no precipitation was reported. In the central valleys the precipitation equalled or exceeded six inches in northeastern Missouri and central Kansas, and no precipitation was reported in areas in western Dakota, west-central and south-central Minnesota, central Texas, and extreme southern Mississippi and Louisiana. East of the Mississippi the precipitation exceeded six inches in south-central New England, on the extreme southeast New England coast, and along the Virginia and Maryland coasts; at Eagle's Mere, Pa., 8.61 inches were reported. In an area in south-central Georgia no rain fell, while at a majority of lake stations in Wisconsin and Minnesota, in the lower Mississippi valley, eastern Texas, central and west-central Florida less than one-half inch of precipitation was reported. The following is the greatest and least precipitation, respectively, reported in the several states and territories: Alabama, 2.30 at Eufaula; 0.03 at Bermuda. Arizona, 2.97 at Tip Top; trace at Saint John's. Arkansas, 5.19 at Ozone; 0.09 at Devall's Bluff. California, 28.57 at Sims; 0.15 at Salton. Colorado, 5.50 at Eagle Farm; trace at Gunnison. Connecticut, 6.56 at Uncasville; 3.55 at Falls Village. Dakota, 1.72 at Spearfish, 0.00 at Wahpeton and Fort A. Lincoln. Florida, 3.16 at Key West; 0.00 at Live Oak. Georgia, 3.12 at Forsyth; 0.00 at several south-central stations. Idaho, 1.84 at Soda Springs; 0.74 at Kootenai. Illinois, 4.63 at Beardstown; 0.14 at Warsaw. Indiana, 3.30 at Rockville; 0.55 at Cannelton. Indian Territory, 5.58 at Fort Supply; 0.93 at Eufaula. Iowa, 2.88 at Keokuk; 0.00 at Eagle Grove. Kansas, 6.75 at Dorrance; 0.02 at Mankato. Kentucky, 5.10 at South Forks; 0.72 at Paducah. Louisiana, 1.50 at Delhi; 0.00 at several southern stations. Maine, 5.86 at Bar Harbor; 1.59 at Farmington. Maryland, 6.25 at Jewell; 2.31 at Cumberland. Massachusetts, 6.21 at Monson; 2.95 at Williamstown. Michigan, 2.35 at Berrien Springs; 0.20 at North Aurelius. Minnesota, 0.34 at Leech Lake and Duluth; 0.00 at several west-central and extreme south-central stations. Mississippi, 0.70 at Agricultural College; 0.00 at several extreme southern stations. Missouri, 6.03 at Wither's Mills; 0.73 at Harrisonville. Montana, 1.27 at Fort Missoula; 0.00 at Fort Shaw. Nebraska, 2.14 at Falls City; trace at Weeping Water. Nevada, 2.41 at Palisade; 0.13 at Wells. New Hampshire, 5.51 at North Chesterfield; 2.96 at Stratford. New Jersey, 5.03 at Tom's River and Hopewell; 1.18 at Valley. New Mexico, 2.55 at Roswell; 0.20 at Coolidge. New York, 5.09 at Boyd's Corners; 0.97 at Schenectady. North Carolina, 4.98 at Southport; 0.45 at Franklin. Ohio, 3.71 at Hanging Rock; 0.50 at Wapakoneta. Oregon, 14.80 at Ellensburgh; 0.80 at Jordan Valley. Pennsylvania, 8.61 at Eagle's Mere; 1.88 at Newcastle. Rhode Island, 5.23 at Narragansett Pier; 3.02 at Kingston. South Carolina, 3.91 at Kirkwood; 0.10 at Port Royal. Tennessee, 2.33 at Charleston; trace at Bolivar. Texas, 4.85 at Hartley; 0.00 at several east-central stations. Utah, 3.85 at Salt Lake City; trace at Ogden. Vermont, 4.75 at Hartland; 2.90 at Strafford. Virginia, 8.17 at Smithfield; 1.69 at Abingdon. Washington, 8.08 at Fort Canby; 0.70 at Fort Walla Walla. West Virginia, 4.54 at Buckhannon; 1.34 at Hinton. Wisconsin, 1.16 at Lincoln; 0.00 at Greenwood and Neillsville. Wyoming, 4.80 at Fort D. A. Russell; 0.32 at Wheatland.

The precipitation for October, 1889, was generally below the normal in the central valleys, the Lake region, the south Atlantic and Gulf states, over the northeastern slope of the Rocky Mountains, the northern part of the northern plateau region, and the extreme eastern parts of the middle and southern plateau regions, and in the British Possessions from the Saint Lawrence Valley to Vancouver Island. The precipitation was generally in excess of the average for the month in New England and the middle Atlantic states, the middle, eastern, and southeastern slopes of the Rocky Mountains, the plateau regions, and on the Pacific coast. The greatest departures below the normal precipitation occurred on the west Gulf coast, where they exceeded five inches, and the most marked excesses in precipitation were reported on the middle and south Pacific coasts, where between the thirty-fourth and forty-first parallels they were more than six inches, and where in the Sacramento Valley they were more than seven inches. Considered by districts the average percentages of the normal precipitation in districts where the precipitation was deficient were about as follows: In the south Atlantic states, 54 per cent.; in the Florida Peninsula, 55 per cent.; east Gulf states, 30 per cent.; west Gulf states, 28 per cent.; Rio Grande Valley, 22 per cent.; Ohio Valley and Tennessee, 55 per cent.; lower lake region, 73 per cent.; upper lake region, 30 per cent.; extreme northwest, 6 per cent.; upper Mississippi valley, 46 per cent.; Missouri Valley, 47 per cent., northeastern slope of the Rocky Mountains, 62 per cent.; southeastern slope of the Rocky Mountains, 75 per cent. In districts where the precipitation was in excess the percentages of the normal were about as follows: New England, 106 per cent.; middle Atlantic states, 143 per cent.; middle-eastern slope of the Rocky Mountains, 202 per cent.; southern plateau region, 107 per cent.; middle plateau region, 158 per cent.; northern plateau region, 194 per cent.; north Pacific coast region, 112 per cent.; middle Pacific coast, 683 per cent.; south Pacific coast over 1,000 per cent. The statement of percentages of precipitation shows that the most marked deficiencies occurred in the extreme northwest, where but 6 per cent. of the normal fell, and that the greatest average excess occurred on the south Pacific coast, where the precipitation was more than ten times greater than the average for October, and on the middle Pacific coast, where it was nearly seven times greater than the normal amount.

A summary of the precipitation in the several districts from January 1 to October 31, 1889, inclusive, shows that in New England the total amount for that period was 40.23, or 0.44 more than the average amount. In the middle Atlantic states the amount, 50.25, was 12.19 in excess of the normal. In the south Atlantic states the total amount was 48.66, giving a deficiency of 0.49. In the Florida Peninsula, 44.40, an excess of 2.69. In the east Gulf states, 43.09, deficiency, 7.34. West Gulf states, 36.72, deficiency, 0.69. Rio Grande Valley, 27.37, excess, 0.33. Ohio Valley and Tennessee, 32.57, deficiency, 7.09. Lower lakes, 24.91, deficiency, 4.58. Upper lakes, 24.78, deficiency, 4.87. Extreme northwest, 11.59, deficiency, 6.30. Upper Mississippi valley, 25.82, deficiency, 6.63. Missouri Valley, 22.68, deficiency, 3.58. Northern slope, 11.68, deficiency, 2.67. Middle slope, 22.71, excess, 1.73. Southern slope, 21.44, deficiency, 1.11. Southern plateau, 8.94, deficiency, 1.69. Middle plateau, 6.85, deficiency, 2.81. Northern plateau, 10.80, deficiency, 3.48. North Pacific coast, 33.72, deficiency, 10.19. Middle Pacific coast, 19.01, excess, 3.81. South Pacific coast, 13.18, excess, 2.06. Among the more notable features shown by this summary are the excessive rainfall in the middle Atlantic states, where the precipitation was in excess of the normal for each month excepting February and August; the deficiency in the Ohio Valley and Tennessee, where the precipitation was less than the normal, excepting in May, June, and September; the marked deficiencies in the Lake region, extreme northwest, and upper Mississippi valley

the continued and marked deficiency in the middle plateau region, where the precipitation was below the normal for each month, excepting October; the large deficiency on the north Pacific coast, where the precipitation was below the normal excepting for May, August, and October; the marked deficiency in precipitation on the middle Pacific coast until October, when the abnormally large rainfall caused an excess of 3.81 for the period; and the rainfall of the south Pacific coast, which had been deficient until the heavy rains of October caused an excess for the ten months of over two inches.

The most notable feature in connection with the precipitation of October, 1889, was the unusually heavy rainfall on the middle and south Pacific coasts, which at stations in west-central and northwestern California was the heaviest ever recorded for the month. At San Francisco the total rainfall for the month was 7.28, an excess of 6.13; at Los Angeles, 6.96, an excess of 6.48; and at Sacramento, 6.02, an excess of 5.20. The reports of the Signal Service observer at San Francisco give the following interesting data in connection with notable excesses and deficiencies in the rainfall of preceding years in that section: In 1849, the October rainfall was 3.14, and the total rainfall for the season of 1849–1850 was 33.10. In October, 1850, no rain fell, and the total fall for the season of 1850–1851 was but 7.40, a most disastrous season to California. In October, 1861, but 0.40 fell, while the rainfall for the season of 1861–1862 was 49.27, the greatest seasonal rainfall in the history of the state. In October, 1876, 3.36 fell, and the total amount for the season of 1876–1877 was 11.04. This was the last really dry season, and thousands of cattle and sheep died from the effects of drought in southern California. At San Francisco the only years in which the October rainfall has approached that of the current month were in 1849, when it was 3.14, and in 1876, when it was 3.36. Since 1849 there have been six years in which no rain fell in October, and two years in which there was but a sprinkle.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for October for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for October, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for October during the period of observation and the years of occurrence:

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Oct.	(2) Length of record.	(3) Total for Oct., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for October.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.80	8	3.88	−0.92	18.11	1883	0.10	1886
California.									
Sacramento	Sacramento	0.68	53	7.01	+6.33	7.01	1889	0.00	*
Colorado.									
Fort Lyon	Bent	0.52	18	2.46	+1.94	3.75	1870	0.00	*
Connecticut.									
Middletown	Middlesex	3.85	28	5.47	+1.62	14.51	1869	0.89	1868
Florida.									
Merritt's Island	Brevard	6.14	11	1.33	−4.81	11.94	1886	1.33	1889
Georgia.									
Forsyth	Monroe	2.80	15	3.12	+0.32	7.86	1879	0.10	1884
Illinois.									
Peoria	Peoria	2.65	33	2.28	−0.37	5.68	1877	0.70	1860
Riley	McHenry	2.73	38	0.40	−2.33	6.81	1881	0.29	1867
Indiana.									
Logansport	Cass	2.98	13	1.00	−1.98	5.47	1881	1.00	1889
Vevay	Switzerland	2.55	24	2.55	0.00	7.67	1883	0.28	1879
Iowa.									
Cresco	Howard	2.41	18	0.13	−2.28	8.06	1881	0.13	1889
Monticello	Jones	2.89	34	1.25	−1.64	7.21	1881	0.43	1872
Logan	Harrison	2.61	21	0.46	−2.15	6.60	1881	0.46	1889
Kansas.									
Lawrence	Douglas	2.81	23	2.86	+0.05	6.96	1870	0.44	1878
Wellington	Sumner	3.58	10	.....	.....	6.32	1882	1.29	1886
Louisiana.									
Grand Coteau	St. Landry	2.72	6	T.	−2.72	3.83	1884	T.	1889
Maine.									
Gardiner	Kennebec	4.16	49	.....	.....	12.67	1869	0.41	1839
Maryland.									
Cumberland	Allegany	2.19	18	2.84	+0.65	6.30	1871	0.00	1879
Massachusetts.									
Amherst	Hampshire	3.92	54	4.14	+0.22	11.36	1869	1.12	1876
Newburyport	Essex	3.58	11	4.71	+1.13	6.83	1885	0.81	1879
Somerset	Bristol	3.78	17	4.40	+0.62	8.21	1877	1.17	1879
Michigan.									
Kalamazoo	Kalamazoo	3.05	13	1.41	−1.64	6.57	1881	1.29	1886
Thornville	Lapeer	3.03	12	1.28	−1.75	5.34	1884	1.28	1889
Minnesota.									
Minneapolis	Hennepin	2.01	23	0.06	−1.95	4.92	1868	0.06	1889
Montana.									
Fort Shaw	Lewis&Clarke	0.54	20	0.00	−0.54	2.22	1883	0.00	1889
New Hampshire.									
Hanover	Grafton	3.40	48	4.60	+1.20	9.24	1869	0.32	1868
New Jersey.									
Moorestown	Burlington	3.26	26	4.03	+0.77	6.83	1877	0.47	1879
South Orange	Essex	3.52	19	3.46	−0.06	7.19	1877	0.27	1879
New York.									
Cooperstown	Otsego	3.32	35	2.17	−1.15	6.65	1857	0.88	1846
Palermo	Oswego	3.45	35	3.28	−0.17	7.90	1862	0.30	1882
North Carolina.									
Lenoir	Caldwell	3.55	18	0.70	−2.85	9.50	1885	0.70	1889
Ohio.									
N. Lewisburgh	Champaign	2.37	17	0.80	−1.57	5.45	1881	0.45	1887
Wauseon	Fulton	2.72	17	0.93	−1.79	8.92	1881	0.93	'74,'89
Oregon.									
Albany	Linn	3.32	9	6.50	+3.18	7.15	1882	0.97	1887
Eola	Polk	2.95	19	5.10	+2.15	8.01	1876	0.30	1874
Pennsylvania.									
Dyberry	Wayne	3.24	18	3.75	+0.51	6.55	1877	1.23	1882
Grampian Hills	Clearfield	2.87	19	3.21	+0.34	4.74	1873	0.81	1887
Wellsborough	Tioga	3.37	10	5.56	+2.19	7.50	1885	0.79	1882
South Carolina.									
Statesburgh	Sumter	3.08	8	2.81	−0.27	8.15	1887	0.02	1884
Tennessee.									
Austin	Wilson	2.87	20	1.31	−1.56	5.11	1883	0.38	1886
Milan	Gibson	2.37	7	0.81	−1.56	4.72	1883	0.81	1889
Texas.									
New Ulm	Austin	4.01	17	0.69	−3.32	12.44	1881	0.69	1889
Vermont.									
Strafford	Orange	3.29	16	2.90	−0.39	6.80	1873	1.20	1882
Virginia.									
Birdsnest	Northampton	3.26	20	7.50	+4.24	9.25	1872	T.	1884
Wytheville	Wythe	3.04	24	.....	.....	9.40	1860	0.50	1875
Wisconsin.									
Madison	Dane	2.90	20	T.	−2.90	9.12	1881	T.	1889
Washington.									
Fort Townsend	Jefferson	1.99	13	2.18	+0.19	3.58	1875	1.00	1885

*Frequently.

The above table shows that at Sacramento, Cal., fifty-three years record, the rainfall for the current month, 7.01, was the greatest ever reported, the heaviest previous October rainfall, 3.45, being noted in 1876, and that at Merritt's Island, Fla., eleven years record; Logansport, Ind., thirteen years record; Cresco, Iowa, eighteen years record; Harrison, Iowa, twenty-one years record; Grand Coteau, La., six years record; Thornville, Mich., twelve years record; Minneapolis, Minn., twenty-three years record; Fort Shaw, Mont., twenty years record; Lenoir, N. C., eighteen years record; Milan, Tenn., seven years record; New Ulm, Tex., seventeen years record; and Madison, Wis., twenty years record; the precipitation was the least ever reported for October. At Wauseon, Ohio, the precipitation for the current month corresponded with the least previous October precipitation, reported for 1874.

Table of excessive precipitation, October, 1889.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Arkansas.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Lead Hill	.....	.....	.....	1.35	0 40	12
California.						
American Hill	11.20	3.00	23	.....	.....	.....
Boulder Creek	19.68	.....	.....	.....	.....	.....
Cisco	11.72	.....	.....	.....	.....	.....
Colegrove	.....	3.33	20	.....	.....	.....
Crescent City	13.76	2.58	6	.....	.....	.....
Delta	26.71	.....	.....	.....	.....	.....
Emigrant Gap	11.81	.....	.....	.....	.....	.....
Eureka	.....	3.06	7-8	1.00	0 40	7

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
California—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Felton	16.91	.....	.....	.....	.....	.....
Georgetown	10.45	.....	.....	.....	.....	.....
Glen Ellen	11.26	.....	.....	.....	.....	.....
Grass Valley	12.49	2.68	22	.....	.....	.....
Laurel	20.48	.....	.....	.....	.....	.....
Los Angeles, Cal	.....	3.62	20–21	.....	.....	.....
Los Gatos (1)	10.85	.....	.....	.....	.....	.....
Los Gatos (2)	11.89	2.50	20	.....	.....	.....
Redding	15.13	.....	.....	.....	.....	.....
Santa Barbara (1)	.....	4.20	20	.....	.....	.....
Santa Barbara (2)	10.50	.....	.....	.....	.....	.....
Santa Margarita	10.85	.....	.....	.....	.....	.....
Sims	28.57	.....	.....	.....	.....	.....
Sisson	16.45	.....	.....	.....	.....	.....
Steeles	.....	3.58	23	.....	.....	.....
Upper Mattole	18.92	3.00	7	.....	.....	.....
Do	.....	3.12	26	.....	.....	.....
Connecticut.						
Fort Trumbull	.....	2.61	27	.....	.....	.....
New London	.....	2.60	27–28	.....	.....	.....
Florida.						
Jupiter	.....	.....	.....	1.10	1 00	5
Illinois.						
Pana	.....	2.50	21–22	.....	.....	.....
White Hall	.....	2.67	22	.....	.....	.....
Kansas.						
Dorrance	.....	2.50	15	.....	.....	.....
Missouri.						
Steelville	.....	.....	.....	1.25	1 00	31
Wither's Mill	.....	2.50	21–22	.....	.....	.....
Shelbina	.....	3.10	21	.....	.....	.....
New Jersey.						
Locktown	.....	2.53	26–27	.....	.....	.....
New York.						
Hess Road Station	.....	2.50	28	.....	.....	.....
North Carolina.						
Wilmington	.....	2.96	26–27	.....	.....	.....
Oregon.						
Bandon	11.80	3.21	8	.....	.....	.....
Ellensburgh	14.80	.....	.....	.....	.....	.....
Gardiner	10.23	.....	.....	.....	.....	.....
Tillamook	11.00	.....	.....	.....	.....	.....
Pennsylvania.						
Germantown	.....	2.53	26–27	.....	.....	.....
Sensholtzville	.....	2.63	28	.....	.....	.....
Swarthmore	.....	2.64	27	.....	.....	.....
Virginia.						
Birdsnest	.....	4.15	23–24	.....	.....	.....
Fort Monroe	.....	3.75	23–24	.....	.....	.....
Norfolk	.....	3.76	23–24	.....	.....	.....
Smithfield	.....	3.05	23	.....	.....	.....
Spottsville	.....	3.00	23–24	.....	.....	.....
West Indies.						
Hamilton (Bermuda)	.....	3.69	8	.....	.....	.....
Havana (Cuba)	.....	4.59	10	.....	.....	.....

Excessive precipitation data received too late to be used in general discussion of weather for October, 1889.

California.						
Anderson	12.32	2.75	22	.....	.....	.....
Mexico.						
La Logia	.....	3.10	12	.....	.....	.....
West Indies.						
Port au Prince (Hayti)	.....	2.50	2	2.50	1 30	2

Excessive precipitation for September, 1889, *received too late for publication in that month.*

Georgia.						
Quitman	.....	2.50	23	.....	.....	.....
New Jersey.						
Tom's River	.....	3.35	12	.....	.....	.....
North Carolina.						
Highlands	.....	3.20	18–19	.....	.....	.....
Statesville	.....	2.77	23–24	.....	.....	.....
Texas.						
Weatherford	.....	3.00	10	.....	.....	.....

EXCESSIVE PRECIPITATION.

Monthly precipitation to equal, or exceed, ten inches was reported at eighteen stations in California and at four stations in Oregon. The heaviest monthly rainfall reported was 28.57, at Sims, Cal.; the monthly rainfall exceeded twenty inches at Delta and Laurel, Cal., and was more than fifteen inches at Boulder Creek, Felton, Redding, Sisson, and Upper Mattole, Cal. The heaviest monthly rainfall in Oregon was 14.80, at Ellensburgh. In October of preceding years precipitation to equal, or exceed, ten inches has been reported most frequently in Florida, where it was noted for sixteen years; in Texas for eleven years; in Louisiana, New Hampshire, New York, North Carolina, Oregon, and Washington for from five to ten years, inclusive; and in Alabama, Arkansas, California, Connecticut, District of Columbia, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, and Virginia for from one to four years, inclusive. In states and territories other than those named monthly precipitation to equal, or exceed, ten inches has not been reported for October of preceding years. Among heavy rainfalls reported for October of preceding years are 20.03 inches at Mayport, Fla., in 1880, and 29.09 ? at Reidsville, N. C., in 1885. Exclusive of the instances and years cited precipitation to equal, or exceed, fifteen inches has been reported for six years in Texas; for four years in Florida; for two years in Georgia, New York, and Virginia; and for one year in Arkansas, Louisiana, Maine, New Hampshire, and North Carolina.

Precipitation to equal, or exceed, 2.50 inches in twenty-four hours in October, 1889, was reported at the greatest number of stations, ten, in California, from the 6th to 8th, and 20th to 23d; at five stations in Virginia, on the 23d and 24th; at three stations in Pennsylvania, from the 26th to 28th; at two in Connecticut, 27th and 28th; at two in Illinois, 21st and 22d; at two in Missouri, 21st and 22d; at one in Oregon, 8th; at one in Kansas, 15th; at one in New York, 28th; and at one in North Carolina, 26–27th. In states and territories other than those named precipitation to equal, or exceed, 2.50 inches in twenty-four hours was not reported for October, 1889. The heaviest daily rainfalls in the states named were: 4.20 at Santa Barbara, Cal., 20th; 3.62 at Los Angeles, Cal., 20th–21st; 2.61 at Fort Trumbull, Conn., 27th; 2.67 at White Hall, Ill., 22d; 2.50 at Dorrance, Kans., 15th; 3.10, at Shelbina, Mo., 21st; 2.53, at Locktown, N. J., 26–27th; 2.50 at Hess Road Station, N. Y., 28th; 2.96 at Wilmington, N. C., 26–27th; 3.21 at Bandon, Oregon, 8th; 2.64 at Swarthmore, Pa., 27th; 3.05, at Smithfield, Va., 23d; and 4.15 at Birdsnest, Va., 23d–24th. At Hamilton, Bermuda, 3.69 inches fell on the 8th, and at Havana, Cuba, 4.59 inches were reported for the 10th. In October of preceding years precipitation to equal, or exceed, 2.50 inches in twenty-four hours has been most frequently reported in Florida, where it has been noted for fifteen years; in Texas for thirteen years; in Georgia and North Carolina for twelve years; in Louisiana and Pennsylvania for eleven years; in Alabama, Connecticut, Illinois, Indian Territory, Kansas, Maine, Maryland, Massachusetts, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, Ohio, Rhode Island, South Carolina, and Virginia for from five to ten years, inclusive; in Arkansas, Dakota, District of Columbia, Indiana, Iowa, Kentucky, Michigan, Minnesota, Oregon, Tennessee, Utah, Vermont, Washington, Wisconsin, Delaware, and New Mexico for from one to four years, inclusive. In states and territories other than those named precipitation to equal, or exceed, 2.50 inches in twenty-four hours has not been reported for October of preceding years. Among the heavier October rainfalls reported for this period are: 10.31 at Saint Augustine, Fla., 9–10th, 1880; 13.14 at Fernandina, Fla., 20th–21st, 1882; 9.24 at Key West, Fla., 20th–21st, 1883; 8.20 at Newport, Fla., 8th, 1876; 7.07 at Fort Robinson, Nebr., 23d, 1887; 7.77 at Galveston, Tex., 2d, 1871; 13.08 at Brackettville, Tex., 1st–2d, 1881. Exclusive of the instances and years cited precipitation to equal, or exceed, five inches in twenty-four hours has been reported in Florida and Texas for three years; in Georgia, Louisiana, and North Carolina for two years; and in Maryland, Mississippi, New York, Pennsylvania, South Carolina, Tennessee, Virginia, and Washington for one year. The only reports of precipitation to equal, or exceed, one inch an hour in October, 1889, were: 1.35 in forty minutes, at Lead Hill, Ark., 12th; 1.00 in forty minutes, at Eureka, Cal., 7th; 1.10 in one hour, at Jupiter, Fla., 5th; and 1.25 in one hour, at Steelville, Mo., 31st. Among

the heavier rainfalls reported for one hour or less in October of preceding years are: 1.20 in six minutes, at Brownsville, Tex., 23d, 1884; 1.80 in twenty minutes, at Fort Scott, Kans., 2d, 1881; 1.50 in twenty-five minutes, at Abilene, Tex., 24th, 1885; 2.12 in twenty-five minutes, at Galveston, Tex., 30th, 1877; 2.30 in thirty minutes, at Des Moines, Iowa, 15th, 1880.

MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfalls during October, 1889, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Bismarck, Dak					T.*	
Boston, Mass	0.05	27	0.08	27	0.23	27
Cincinnati, Ohio	0.10	12	0.15	12	0.20	25
Chicago, Ill†	0.05	30	0.05	30	0.15	30
Detroit, Mich	0.08	12	0.12	12	0.35	12
Dodge City, Kans	0.07	7	0.11	7	0.27	7, 13, 14
Jupiter, Fla	0.35	5	0.65	5	1.10	5
Marquette, Mich	0.02	25	0.05	25	0.05	25
New York City	0.04	12, 21	0.07	12, 21	0.21	12, 13
New Orleans, La	0.16	5	0.15	19	0.25	19
Savannah, Ga	0.02	26	0.04	26	0.13	26
San Francisco, Cal	0.12	7	0.21	7	0.63	7
Saint Louis, Mo‡						
Washington City	0.02	23, 27	0.05	23, 27	0.22	23

*Total for month. †Record not complete. ‡Rain gauge not working.

The table shows that the greatest rate per minute for a five-minute period was .07, at Jupiter, Fla., 5th. The rate per minute for this period at the other stations given was, .024 at San Francisco, Cal., 7th; .02 at Cincinnati, Ohio, 12th; .02 at New Orleans, La., 5th; .016 at Detroit, Mich., 12th; .014 at Dodge City, Kans., 7th; .01 at Boston, Mass., 27th; .01 at Chicago, Ill., 30th; .008 at New York, N. Y., 12th and 21st; .004 at Marquette, Mich., 25th; .004 at Savannah, Ga., 26th; .004 at Washington, D. C., 23d and 27th. The greatest rate per minute for a ten-minute period was .065, at Jupiter, Fla., 5th. The rate per minute for this period at San Francisco, Cal., was .021, on the 7th; at Cincinnati, Ohio, .015, on the 12th; at New Orleans, La., .015, on the 19th; at Detroit, Mich., .012, on the 12th; at Dodge City, Kans., .011, on the 7th; at Boston, Mass., .008, on the 27th; at New York, N. Y., .007, on the 12th and 21st; at Chicago, Ill., .005, on the 30th; at Marquette, Mich., .005, on the 25th; at Washington, D. C., .005, on the 23d and 27th; and at Savannah, Ga., .004, on the 26th. The greatest hourly rainfall registered was 1.10, at Jupiter, Fla., on the 5th. At the other stations given the maximum rainfall for one hour was less than one inch.

SNOW (snowfall in inches and tenths).

Snow fell north of a line traced from extreme southern New Jersey westward to southeastern Ohio, thence northwest to central Michigan, thence southwest to northern Illinois, thence northward to northwestern Michigan, thence to northern Dakota, thence southward to extreme southern Kansas, thence southwest to central New Mexico, thence northward to southern Wyoming, thence to south-central Utah, thence to eastern California in about latitude north thirty-eight, and east of this line continued northward over eastern Oregon. The snowfall was unusually heavy for the season in central Colorado, southeastern Wyoming, and in Plumas Co., Cal., where it equalled or exceeded twenty inches, and amounted to twenty-four inches at Summit, Plumas Co., Cal., and Fort D. A. Russell, Wyo. In New England the snowfall was heaviest in New Hampshire, where it amounted to two inches at Berlin Mills and Manchester; in the middle Atlantic states the greatest fall reported was two inches at Nineveh, N. Y., and trace fell as far south as Washington, D. C. No snow fell in the Ohio Valley, except over the eastern half of Ohio, where trace was reported. The heaviest fall reported in the lower lake region was two inches at Pendleton Centre, N. Y., and in the upper lake region, 1.4 inches at Port Huron, Mich. No snow was reported in the upper Mississippi valley, and the heaviest fall in Dakota was 1.5 at Spearfish. Trace was reported in New Mexico as far south as Fort Stanton, and 4.2 inches fell at Beaver, Utah.

Snowfalls of one inch, or more, were reported as follows: *California*—Summit, 24; Cisco, 4.2; *Colorado.*—Husted, 23; Palmer Lake, 22: Boulder Cañon and Loveland, 18.5; Dolly Varden Mines, Elkhorn, and Fort Logan, 17; Climax, 16; Denver, Magnolia, and Eagle Farm, 14; Colorado Springs, 13.9; Moraine, 13.5; Villa Grove, 13; Georgetown, 12.5; Longmont and Leadville, 12; Aspen, 11.5; Cumbres, 11; Breckenridge, 9.5; Denver, J. College, 8.5†; Fort Collins, 8.5; T. S. Ranch, 8; Ranch near Como, 7.9; Agate and Cañon City, 7.5; Byers and Pueblo, 7; Rocky Ford, 6; Burlington, Grand Lake, and Thon, 5; Fraser, 4.5; Apishapa and Greeley, 4; First View, Las Animas, Fort Crawford, and Vilas, 2; Hardin, 1.5; Rifle Falls, 1.3; Aroya, Emma, and Julesburg, 1. *Idaho.*—Soda Springs, 5.5. *Kansas.*—Tribune, 8; Richfield, 6; Macksville and Offerle, 3; Bucklin, Bunker Hill, Dodge City, Lincoln, Quinter, and Winona, 2; Cawker City and Victoria, 1. *Michigan.*—Port Huron, 1.4. *Montana.*—Helena, 1. *Nebraska.*—Gering, 6. *Nevada.*—Fenelon and Halleck, 2.5; Golconda, 1.5; Battle Mountain, Beowawe, Tacoma, and Toano, 1. *New Hampshire.*—Berlin Mills and Manchester (1), 2; Antrim, Manchester (2), Walpole, and West Milan, 1. *New Jersey.*—Egg Harbor City, 1. *New York.*—Nineveh and Pendleton Centre, 2; Alfred Centre and Number Four, 1.5; South Kortright, 1.1; Cooperstown and South Canisteo, 1. *Oregon.*—Beulah, 2.5; Telocaset and Jordan Valley, 2. *Pennsylvania.*—Blue Knob, 3.6; Le Roy, 1.9; Coatsville, Gettysburgh, Huntington, Johnstown, and New Bloomfield, 1. *Dakota.*—Spearfish, 1.5. *Utah.*—Beaver, 4.2. *Vermont.*—Jacksonville, 1. *Wyoming.*—Fort D. A. Russell, 24; Cheyenne, 12; Camp Sheridan, 3.7; Lusk, 3; Camp Pilot Butte, 2.2; Fort Washakie (1), 2.3; Forts Laramie and Washakie (2), 1.5; Evanston, 1.

HAIL.

The more severe hail-storms of the month are referred to under "Local storms." Hail was reported during the month as follows: 1st, Mass., N. J., N. Y., Pa. 2d, Mich., Wis. 6th, Ohio. 7th, Miss., Nev., Ohio. 8th, Miss., Nev., N. Y., Pa. 9th, N. Y. 10th, N. Y., R. I. 11th, Iowa, Kans., Ohio. 12th, Ark., Ill., Ind., Kans., Ohio, Pa. 13th, Colo. 14th, Conn. 15th, N. J., N. Mex., Pa., Tenn., Tex., Va. 16th, Ohio. 18th, Nev., Pa. 21st, Kans., Me., Mass. 22d, Ark., Mo., N. C. 23d, Va. 24th, Mich., Nev. 25th, Ala., Miss., Nev., N. C. 26th, Ala., Cal., Miss. 27th, Ariz., Oregon, Utah. 28th, Miss., N. Mex., Wash. 29th, Ark., Kans., Miss., Oregon. 30th, Kans., Utah, Wis. 31st, Tex.

SLEET.

The more severe sleet storms of the month are referred to under "Local storms." Sleet was reported during the month as follows: 1st, N. Y. 5th, Mich. 6th, Mich., N. Y., Ohio. 7th, Mich. N. Y., Ohio, W. Va. 8th, Pa. 13th, Colo. 14th, Colo., Pa. 15th, Va. 21st, Dak., Mass., Mich. 22d, Dak., Pa., Wis. 23d, D. C., Md., Mich., Pa., Wis. 24th, Wis. 25th, Ala. 27th and 28th, Utah. 29th, Pa. 30th, Pa., Utah. 31st, Dak., Kans., Nebr., Utah.

WINDS.

The prevailing winds during October, 1889, are shown on chart ii by arrows flying with the wind. In New England, the Florida Peninsula, and the upper and lower lake regions northeast to northwest winds prevailed; in the middle Atlan-

tic states and the extreme northwest they were mostly from north to northwest; in the south Atlantic and east Gulf states, the Ohio Valley and Tennessee, and the upper Mississippi valley from the north; in the west Gulf states from northeast to southeast; in the Rio Grande and Missouri valleys from the southeast; on the southeastern slope of the Rocky Mountains from south to southwest; over the northern plateau region and on the middle Pacific coast from southeast to southwest; on the south Pacific coast from west to northwest; on the northeastern and middle-eastern slopes of the Rocky Mountains, the southern and middle plateau regions, and on the north Pacific coast the winds were variable.

HIGH WINDS.

(In miles per hour.)

The highest wind velocity reported was 78, ne., at Block Island, R. I., 14th. Maximum velocities of fifty miles, or more, were reported as follows: Block Island, R. I., 70, ne., 15th; 64, ne., 16th; Fort Canby, Wash., 72, s., 1st; 55, s., 29th; Hatteras, N. C., 76, n., 24th; 52, nw., 15th; 56, n., 16th; 54, n., 23d; Wood's Holl, Mass., 60, w., 10th; Fort Assinniboine, Mont., 57, w., 1st.

LOCAL STORMS.

Hail storms, accompanied by thunder and lightning, were reported at Philadelphia, Pa., 1st; at Green Bay, Wis., 2d; at Lead Hill, Ark., 12th; at Meridian, Miss., 25th; and at Long View, Tex., 30th. In each instance the hail storms occurred in the afternoon. Destructive gales were reported as follows: Port Huron, Mich., 5–6th: maximum velocity forty-two at 7 a. m. of the 6th. The gale was attended by rain, sleet, and snow, and numerous casualties of a minor character occurred. Detroit, Mich., 5–7th: maximum velocity thirty-four at 2.26 a. m. of the 6th. The Signal Service observer at Detroit reports that this was the most destructive storm in that region in years; that all classes of vessels suffered more or less damage, and that heavy and destructive seas occurred along the shores of Lake Huron. From the 13th to the 16th heavy gales prevailed along and off the coast from New England to the Carolinas, the wind attaining hurricane force at sea, and causing considerable loss and damage to shipping. From the 23d to 25th destructive gales prevailed along and off the coast from the Carolinas to New Jersey. The unprecedentedly heavy rains on the middle and south Pacific coasts are referred to under "Precipitation".

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several stations; the highest and lowest water during October, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, Oct., 1889, (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	3,4	19.9	31	6.3	13.6
Arkansas River:						
Fort Smith, Ark	22.0	1	1.9	22	1.0	0.9
Little Rock, Ark	23.0	1	4.0	11–16, 22–31	2.8	1.2
Missouri River:						
Fort Buford, Dak	.....	28	—0.2	1, 7, 8, 9	—0.6	0.4
Kansas City, Mo	21.0	2	4.8	20	3.7	1.1
Mississippi River:						
Saint Paul, Minn	14.5	1, 2	2.0	20, 27	1.6	0.4
La Crosse, Wis	24.0	1–6	2.4	27–31	1.7	0.7
Dubuque, Iowa	16.0	1	2.3	30, 31	1.7	0.6
Davenport, Iowa	15.0	1, 2	1.3	25–31	0.8	0.5
Keokuk, Iowa	14.0	1	0.8	28, 29, 30	0.0	0.8
Saint Louis, Mo	32.0	1, 2	5.0	18	3.0	2.0
Cairo, Ill	40.0	1, 2, 3	8.0	22, 23	2.5	5.5
Memphis, Tenn	34.0	4, 5, 6	6.2	25	2.5	3.7
Vicksburg, Miss	41.0	1	8.0	29, 30, 31	—0.8	8.8
New Orleans, La	13.0	2	4.1	25–28	2.5	1.6
Ohio River:						
Pittsburgh, Pa	22.0	29	10.3	25	0.9	9.4
Parkersburg, W. Va.	38.0	31	9.7	15	2.9	6.8
Cincinnati, Ohio	50.0	1	12.1	12	5.9	6.2
Louisville, Ky	25.0	2	6.5	14, 15, 16	4.3	2.2
Cumberland River:						
Nashville, Tenn	40.0	1	8.8	19	1.6	7.2
Tennessee River:						
Chattanooga, Tenn	33.0	1	4.8	23, 24	2.1	2.7
Monongahela River:						
Pittsburgh, Pa	29.0	29	10.3	25	0.9	9.4
Savannah River:						
Augusta, Ga	32.0	28	8.7	19–23	6.3	2.4
Willamette River:						
Portland, Oregon	15.0	30	4.0	19, 20	0.5	3.5

Navigation was suspended on the Tennessee River at Chattanooga, Tenn., from the 7th to 14th on account of low water. On the Mississippi River, at Dubuque, Iowa, navigation had been almost suspended on the 27th on account of low water; only small boats being able to move. The last packet boat of the season passed down the river at La Crosse, Wis., on the 7th. On the 31st on the Ohio River at Parkersburgh, W. Va., navigation was fully resumed, after having been suspended on account of low water since August 20, 1889. The "Post-Express," Rochester, N. Y., of October 23, 1889, states that the Erie Canal, which feeds a number of streams for water-power purposes, was so low that all feeding gates were ordered closed; that manufacturers were compelled to close down at a loss of hundreds of thousands of dollars; that many canal boats were stranded at Tonawanda, and that navigation on the Welland Canal was considered dangerous on account of low water. The low water was attributed to the continued easterly winds which had been blowing with more or less violence throughout October.

FLOODS.

At Bellows Falls, Vt., a severe rain storm began on the morning of the 6th, and continued until the following morning. The streams in that vicinity rose rapidly, damaging or carrying away a number of bridges. At Augusta, Me., the Kennebec River rose very rapidly on the 12th, and great damage was reported all along that river. The "Morning Call," San Francisco, Cal., of October 15th, states that advices from Encinitas, San Diego, Co., Cal., report a rainfall of 7.58 inches at that place from 10 p. m. of the 12th to 6 a. m. of the 13th, which caused considerable damage; the storage reservoir at Cottonwood Canyon broke, and a large body of water rushed down the valley, washing away the railroad bridge and doing much injury to ranches. The Signal Service observer at Los Angeles, Cal., reports that 3.16 inches of rain fell at that place from 8.15 a. m. to 4.45 p. m. on the 20th, flooding streets and cellars; submerging the engine house of the cable road, and stopping the engines. He further reports that from this date showers occurred daily until the 23d. On this latter date 1.87 inch fell and numerous washouts occurred on the railroads centering in that city; the Santa Monica Line of the Southern Pacific Railroad suffering the severest damage from a reported cloud-burst in the Santa Monica Mountains, which also destroyed a considerable portion of the Los Angeles and Pacific Railroad.

HIGH TIDES.

At Norfolk, Va., high tides, caused by the heavy northeast wind of the 23d and 24th, submerged wharves and piers, and the eastern, southern, and western ends of the city were flooded. At Hatteras, N. C., on these dates the high wind caused the tide to rise higher than ever before known at that place. At New London, Conn., on the 25th, the tide rose higher than noted for several preceding years. The report of Mr. Albert E. Acworth, voluntary observer at Barren Creek Springs, Md., states that on the 27th the tide in the Nanticoke River, at Riverton, rose three feet above the usual mark and was the highest since 1876, and that the tide remained high for ten days.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were observed during the month as follows: 1st, South Canisteo, N. Y. 2d, Webster, Dak.; Montevideo, Minn. 3d and 4th, Webster, Dak. 5th, Fort Yates, Leech Farm, Webster, and Wolsey, Dak.; Embarrass, Wis. 6th, Webster, Dak. 13th, Leech Farm, Dak.; Embarrass, Wis. 14th, South Canisteo, N. Y. 18th, Kimball, Dak.; Newburyport, Mass. 19th, Lyons, N. Y. 20th, Fort Sully, Dak. 21st, Kent's Hill, Me.; Amherst, Mass.; Lyons, N. Y.; Northfield, Vt. 23d, Kent's Hill and Orono, Me.; Plymouth, N. H.; Lyons, N. Y.; Northfield, Vt. 26th, Egg Harbor City, N. J. 28th, Woodbury, N. J. 29th, Manitowoc, Wis. The more notable auroral displays are described as follows:

Fort Yates, Dak.: an auroral display was first observed at 11.40 p. m. of the 5th. It consisted of an arch, which was partly obscured by clouds, extending from azimuth 135° to 225° and to about altitude 15°. A few yellowish streamers rose from the arch. The display was last seen at 11.50 p. m.—*Report of George W. Scott, observer, Signal Corps.*

Fort Sully, Dak.: a distinct auroral display was observed at 9.45 p. m. of the 20th, and continued during the remainder of that date. The centre of the display was almost due north, and its principal light was of an intense yellowish red. The display rose to about altitude 45°, and extended from azimuth 170° to 190°.—*Report of I. G. Gardiner, observer, Signal Corps.*

THUNDER-STORMS.

The more severe thunder-storms of the month are referred to under "Local storms." Thunder-storms were reported in the greatest number of states and territories, twenty-two, on the 12th; in thirteen on the 30th; in twelve on the 11th; in eleven on the 1st, 13th, and 27th; in nine on the 22d, 25th, and 31st; in eight on the 23d and 29th; in six or seven on the 2d, 15th, 26th, and 28th; and in from one to five from the 3d to 10th, 14th, 16th, 17th, 19th, 20th, 21st, and 24th. The 18th was the only date on which no thunder-storm was reported.

Thunder-storms were reported on the greatest number of dates, ten, in Illinois, Kansas, and Missouri; on nine in New York; on eight in Kentucky, Ohio, Pennsylvania, and Tennessee; on seven in Texas; on six in Arkansas, California, Colorado, Florida, Michigan, South Carolina, and Virginia; on from one to five, inclusive, in Alabama, Arizona, Connecticut, District of Columbia, Georgia, Idaho, Indiana, Iowa, Louisiana, Maine, Maryland, Massachusetts, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, Oregon, Rhode Island, Dakota, Utah, Vermont, West Virginia, Wisconsin, and Wyoming. No thunder-storms were reported in Delaware, Indian Territory, Minnesota, and Washington.

VERIFICATIONS.

FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for October, 1889, were made by Assistant Professor, H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, October, 1889.

States.		States.	
Maine	85.5	Tennessee	85.8
New Hampshire	82.9	Kentucky	85.5
Vermont	80.1	Ohio	80.7
Massachusetts	84.8	West Virginia	85.4
Rhode Island	87.0	Indiana	84.2
Connecticut	85.2	Illinois	84.6
Eastern New York	80.3	Lower Michigan	85.2
Western New York	86.6	Upper Michigan	82.1
Eastern Pennsylvania	82.3	Wisconsin	86.2
Western Pennsylvania	85.7	Minnesota	85.6
New Jersey	88.5	Iowa	85.6
Delaware	90.0	Kansas	79.7
Maryland	86.3	Nebraska	83.6
District of Columbia	86.5	Missouri	82.4
Virginia	85.9	Colorado	81.6
North Carolina	89.9	Dakota	82.3
South Carolina	92.5	Southern California*	80.3
Georgia	89.3	Northern California*	87.8
Eastern Florida	93.1	Oregon*	83.6
Western Florida	91.2	Washington Territory*	78.6
Alabama	87.8	*By elements:* Weather	89.5
Mississippi	83.6	Temperature‡	79.4
Louisiana	86.2	Monthly percentage of weather and temperature combined†	85.5
Texas	88.2		
Arkansas	87.0		

*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10. ‡The forecasts of temperature in districts east of the Rocky Mountains for October, 1889, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day.

FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third day in advance. Such forecasts are optional with the predicting officer, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 245; temperature, 45. Percentages of verifications: weather, 88.8; temperature, 94.7. Weather and temperature combined, 91.2.

Percentages of verifications of forecasts made for third day in advance. Number of predictions made: weather, 7; temperature, 1. Percentages of verifications: weather, 100; temperature, 100. Weather and temperature combined, 100.

CAUTIONARY SIGNALS FOR OCTOBER, 1889.

Statement showing percentages of justifications of wind signals for the month of October, 1889:

Wind signals.—(Ordered by Assistant Professor H. A. Hazen.) Total number of signals ordered, one hundred and nineteen; justified as to velocity, wholly, eighty-one, partly, five; justified as to direction, one hundred and ten. Of the signals ordered, ninety-six were cautionary, of which sixty-five were wholly, and one partly, justified; and twenty-three were storm signals, of which sixteen were wholly, and four partly, justified. Sixty-five signals were ordered for easterly winds, of which fifty-six were justified, and fifty-four were ordered for westerly winds, all of which were justified. Percentage of justifications, 69.7.

No cold-wave signals were ordered during the month.

Percentages of local verifications of weather and temperature signals reported by directors of the various State Weather Services for October, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois	88.0	78.8	Nebraska	79.4	88.0
Indiana	89.0	88.0	New Jersey	83.7	93.1
Kentucky	85.0	89.0	New York	80.7	87.6
Louisiana, northern	82.0	97.0	Ohio	87.0	83.0
Louisiana, southern	94.0	90.0	Oregon	68.0	75.0
Michigan	87.9	82.0	Pennsylvania	87.0	90.0
Minnesota	79.0	80.0	South Carolina	88.2	85.4
Missouri	87.0	89.0			

MISCELLANEOUS PHENOMENA.

DROUGHT.

A protracted drought was general throughout Alabama, Louisiana, Michigan, and Minnesota, east-central Texas, the extreme northern part of South Carolina, the northeastern parts of Indiana and Illinois, northern Iowa, and the northwestern portions of Ohio and Wisconsin. The following are reports on drought in sections of the country where it was the most severely felt. The report of the Alabama weather service states that the precipitation for the month in that state was less than in any month of October since the establishment of that service; that the wells were so low in some portions of the state as to cause serious apprehension that much disease would result, and that the potato and turnip crops were considerably damaged by the dry condition of the ground. The report of the Louisiana weather service states that the drought during the month was unbroken save by occasional local sprinkles; that in a majority of parishes the rainfall was barely measurable, and at a number of places no rain was reported; that the drought was a continuation of that existing in northern Louisiana from the first ten days of September and in southern Louisiana from September 25th, the date of the last general rain; and that in consequence of the drought the fall garden produce was a complete failure. The report of the Minnesota weather service states that a prolonged drought continued throughout the month; that it was the dryest October ever experienced in that state; that the precipitation for the month was but about 6 per cent. of the normal; that the stage of water in rivers was very low, and some of the smaller lakes and rivers were entirely dry, and that farmers in certain localities were obliged to drive their cattle several miles to obtain water. The Signal Service observer at Port Huron, Mich., reports that the drought continued in that vicinity, and that the rainfall during the month afforded only slight relief; that farmers report the condition of sown wheat as unsatisfactory on account of the dryness of the soil, and the wells are dry. A report from Decatur, Ind., dated October 22, 1889, states that no rain had fallen in that section for six weeks; that wells and cisterns were giving out, and that stock was suffering for want of water. Mr. John W. James, voluntary observer at Riley, Ill., reports, under date of the 31st, that on account of the protracted drought pastures were parched; that the ground was harder than ever before known at that season, and that no fall plowing had been done in consequence. Mr. John S. Seely, voluntary observer at Oswego, Ill., reports that the rainfall for the month was the smallest October rainfall in nine years; that the ground was too dry for plowing, and that wells and springs were very low and many of them dry.

The Signal Service observer at Dubuque, Iowa, reports, under date of the 28th, that the drought was very extensive, and was becoming serious in sections where the water supply was short for the stock, and that the ground was too dry for plowing. The Signal Service observer at Sioux City, Iowa, reports, under date of the 8th, that a severe drought prevailed in the adjacent country, and that in many localities cattle had to be driven miles for water; and under date of the 31st he reports that in the northern part of the state the water supply was very short, and that farmers were buying water by the barrel for their stock. Mr. J. Fred. Bayerly, volunteer observer at Cedar Springs, S. C., reports that a protracted drought prevailed in that section from September 24th throughout October, and that water was scarce and wells failing. The Signal Service observer at Palestine, Tex., reports, under date of the 29th, that but little rain had fallen in that section for over a month; that the soil was dry and hard, and farmers had been unable to do their work satisfactorily, and that the drought was broken by heavy rain the evening of the 29th. The Signal Service observer at La Crosse, Wis., reports, under date of the 24th, that the ground was very dry and parched, and that the drizzle that fell during that day was the first rain of the month. Dr. T. C. Hunter, voluntary observer at Napoleon, Ohio, reports that on account of the drought the wells and streams in that section were very low and many entirely dry, and that water had to be hauled for all purposes.

FOREST FIRES.

Destructive marsh fires were reported near Jackson, Mich., on the 3d and 22d, and in the interior of the state on the 17th, doing considerable damage to standing timber, outbuildings, etc. On the west side of the Grand River, opposite Portland, Mich., fires were reported from the 11th to 14th, and on the 21st forest fires were raging about Coleman, Mich. Mr. J. M. Harrison, voluntary observer at Friendship, Wis., reports that forest fires from the 15th to 25th burned hundreds of tons of hay and large quantities of timber in that section. Destructive fires were reported at Ellsworth, Wis., on the 22d, and at Chippewa Falls, Wis., on the 19th. In Minnesota destructive forest fires were reported at Saint Peter on the 4th; at Stillwater on the 16th; and in the vicinity of Princeton they were reported under date of the 19th as having been raging in that section for three weeks. The Signal Service observer at Rapid City, Dak., reported a forest fire west of that place on the 17th. Fires were reported in the neighborhood of Decatur, Ind., on the 22d, and about fifty miles south of Palestine, Tex., on the 28th.

PRAIRIE FIRES.

An extensive prairie fire was reported near Spirit Lake, Iowa, on the 5th; in Palo Alto Co., Iowa, on the 7th; near Fergus Falls, Minn., on the 24th, and about Bismarck, Dak., on the 19th.

HALOS.

Solar halos were most frequently reported in Illinois, where they were noted on thirteen dates; in California on ten dates; in Ohio on nine dates; in Indiana and South Carolina on seven dates; in Massachusetts and Nevada on six dates; and on from one to five dates, inclusive, in Arkansas, Colorado, Georgia, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. In states and territories other than those named no solar halos were reported. They were reported in the greatest number of states and territories, eleven, on the 19th; in nine on the 3d; in eight on the 12th, 21st, and 24th; in seven on the 30th; in six on the 5th, 16th, 17th, 18th, and 22d; in from one to five, inclusive, on the 1st, 2d, 4th, 8th to 11th, 13th, 14th, 15th, 20th, 23d, 25th to 29th, and 31st. No solar halos were reported on the 6th and 7th.

Lunar halos were most frequently reported in Iowa, where they were noted on eight dates; in California, Illinois, and Nevada on seven dates; in Wisconsin on six dates; and on from one to five dates, inclusive, in Arizona, Arkansas, Colorado, District of Columbia, Florida, Georgia, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Dakota, Tennessee, Texas, Virginia, Washington, and Wyoming. In states and territories other than those named no lunar halos were reported. They were reported in the greatest number of states and territories, seventeen, on the 3d; in ten on the 4th; in sixteen on the 5th; in nine on the 6th; in seven on the 10th and 11th; in six on the 1st, 2d, and 31st; in from one to five on the 7th, 8th, 12th to 19th, and from the 27th to the 30th. For dates other than those named no lunar halos were reported.

METEORS.

The distribution of meteors, by dates, was as follows: 2d, Matanzas, Fla.; Rugby, Tenn. 6th, Lead Hill, Ark.; Fort

Washakie, Wyo. 7th, Lead Hill, Ark. 9th, Butlerville, Ind. 12th, Rugby, Tenn.; Mesquite, Tex. 13th, North Sutton, N. H. 14th, Manson, Iowa; Vevay, Ind.; Fairmont, Minn.; Palestine, Tex. 15th, Ilion, Ithaca, Trumansburgh, and Wedgwood, N. Y. 16th, Fairmont, Minn.; Egg Harbor City, N. J.; Trumansburgh, N. Y. 17th, Ames and McCausland, Iowa; Las Vegas, N. Mex.; Statesburgh, S. C. 18th, Auburn, Ala.; Wichita, Kans.; Montevideo, Minn.; Eagle's Mere, Pa. 19th, Egg Harbor City, N. J.; Statesburgh, S. C.; Dale Enterprise, Va. 20th, Dale Enterprise, Va. 21st, Barren Creek Springs, Md.; Amherst, Mass.; East Portland, Oregon; Memphis, Tenn. 23d, Rugby, Tenn. 24th, Villa City, Fla.; Atlanta, Ga.; Rugby, Tenn. 25th, Amherst, Mass. 26th, Auburn, Ala.; North Sutton, N. H. 27th, Saint Vincent, Minn. 29th, Fort Thomas, Ariz. 31st, Berkley, Cal.; Villa City, Fla.

Ilion, N. Y.: a brilliant meteor was observed at 6.34 p. m., 15th, moving rapidly towards the west. It seemed to start from the zenith, growing brighter, and followed by a long trail of light. When at an altitude of 20° or 25° it burst without report, and was followed by a long trail of brilliant sparks.—*Report of Mr. G. A. Trowbridge, voluntary observer.*

Wichita, Kans., 18th: a brilliant meteor was observed passing horizontally westward at an elevation of 30° and about 10° east of north. The meteor remained visible four seconds.—*Report of F. L. Johnson, observer, Signal Corps.*

Dale Enterprise, Va.: unusual meteoric displays were observed during the night of the 19-20th. The greatest frequency being noted between 1 and 2 a. m., 20th, when the average was one in about every forty seconds. The radiant point was a little south of east, apparently in the constellation Taurus.—*Report of L. J. Heatwole, voluntary observer.*

Fort Thomas, Ariz.: a brilliant meteor of a bright green color was observed at 8 p. m. on the 29th, moving from southwest to northeast at an elevation of 45°.—*Report of A. T. Sherwood, observer, Signal Corps.*

MIRAGE.

Mirage were observed as follows: Hampton, Iowa, 27th, 28th; Fairmont and Montevideo, Minn., 18th; Webster, Dak., 17th; Woonsocket, Dak., 27th.

SAND STORMS.

Sand storms were reported during the month as follows: Wilcox, Ariz., 6th and 30th; Winnemucca, Nev., 6th and 7th; Fresno, Cal., 7th.

SUN SPOTS.

Mr. John W. James, Riley, Ill.: the large single spot that was seen on sun's meridian September 29th, split in two October 2d, and vanished by the 4th, before reaching the edge. No other spot was seen the rest of the month. Mr. C. E. Buzzell, Leaf River, Ill.: solar observations in October, 1889, were made only on the 1st, 2d, 3d, 4th, 11th, 17th, 27th, and 28th; on other dates clouds and haze prevented the observations from being taken. The group of September 26th disappeared in faculæ October 4th. No other disturbances were observed.

Mr. M. A. Veeder, Lyons, N. Y.: the spot that came into view September 23d, was seen October 1st and 2d approaching the western limb. Faculæ in its location returned by rotation October 19th. Faculæ, that appeared September 28th, seen nearing the western limb October 8th. October 8th, faculæ appeared and persisted throughout the transit, being seen near the western limb on October 18th and 19th. Groups of faculæ appeared by rotation on October 14th, 15th, 17th, 19th, 21st, 23d, and 24th. Observations were poor or wanting on many days in this month.

Mr. H. D. Gowey, North Lewisburgh, Ohio: sun spots were observed on the 1st and 2d.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Faculæ.	
Oct., 1889.											
1, 10 a. m ...	0	0	0	0	0	0	1	5	....	....	Definition poor, big spot breaking up.
2, 9 a. m ...	0	0	0	0	0	0	1	14	....	....	Definition good.
3, 12 m.....	0	0	0	0	0	0	1	4	....	....	Definition good, big spot gone to pieces.
4, 12 m.....	0	0	0	0	0	0	1	1	....	....	Definition poor.
5, 12 m.....	0	0	1	1	0	0	0	0	....	....	Definition poor.
7, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.
8, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.
9, 10 a. m ...	1	4	0	0	0	0	1	4	....	....	Definition good, spots small.
10, 11 a. m ...	0	4	0	0	0	0	1	8	....	....	Definition good.
11, 11 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor and cloudy.
12, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition good.
15, 3 p. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor and cloudy.
16, 10 a. m ...	1	5	0	0	0	0	1	5	....	....	Definition poor, spots small.
17, 10 a. m ...	0	7	0	0	0	0	1	12	....	....	Definition good.
18, 10 a. m ...	0	0	0	10	0	0	1	2	....	....	Definition good.
19, 10 a. m ...	0	0	1	2	0	0	0	0	....	....	Definition good.
20, 9 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition good.
21, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.
22, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.
24, 10 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.
30, 11 a. m ...	0	0	0	0	0	0	0	0	....	....	Definition poor.

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts are republished from reports for September, 1889, of the directors of the various state weather services:

ALABAMA.

The average rainfall for the month was 1.46 below the normal, and the season has been unusually dry. October is generally considered to be a dry month, but the period just closed produced less precipitation than in any other year since this service was organized. The wells have been so low in some portions of the state as to cause serious apprehensions that much disease would result. The dry season, however, has been of great advantage to the farmers, giving them an excellent opportunity for gathering the rapidly opening cotton; and there has been only a small percentage of the staple stained.

Frost occurred several times during the month, but, except in extreme north Alabama, they have all been light. The one on the 28th was reported by some observers as sufficiently heavy to kill tender vegetation. The temperature was 2 below the normal.

SUMMARY.

Temperature.—Monthly mean, 61.2; highest monthly mean, 77.5, at Selma; lowest monthly mean, 41, at Valley Head; maximum, 90, at Double Springs, 4th, and at Pine Apple, 6th; minimum, 27, at Double Springs, 9th, and at Valley Head, 8th; range for state, 63.

Precipitation.—Average for the state, 0.98; greatest, 2.30, at Eufaula; least, 0.08, at Mobile.

Wind.—Prevailing direction, northwest.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

SUMMARY.

Temperature.—The mean temperature of the month, 61.8, was 2.7 above the mean of October of last year.

Frost was reported at many places from the 7th, 8th, 9th, 14th, 15th, 16th, and a general frost occurred on the mornings of the 27th and 28th.

Precipitation.—The average rainfall for the state, 1.64, is 0.56 below the average for the same month last year. With the exception of a few places there was no rainfall reported in the state until the 29th, and then, although a general rain, it was not very heavy, except in a few localities where it was accompanied by thunder and lightning and some wind, and nowhere was excessive rain reported. The average number of rainy days was 4.6.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

SUMMARY.

Temperature.—The monthly average for the state, 46.9, is about 2.0 above

the normal; highest monthly mean, 57.1, at Las Animas; lowest monthly mean, 24.0, at Pike's Peak, the next lowest being 28.8, at Dolly Varden Mine; maximum for the state, 100, at Magnolia, 5th; minimum —9, at Pike's Peak, 31st, and 0, at Dolly Varden Mine, 30th. The absolute range for the state was 109, while the greatest local monthly range was 81, at Breckenridge, and the least 35, at Leadville. The maximum temperature at most stations was reported between the 1st and 3d and the minimum on the last two days.

Precipitation.—The average precipitation was 1.55, an excess of 78 per cent. over the average October precipitation for the past three years. The heavy snow storm which prevailed over most of the state on the 30th and 31st contributed mostly to this excess. The heaviest monthly precipitation was 5.50, at Eagle Farm, and the least reported was trace, at Sedgwick. The average depth of snowfall over the state was 7.6, and the average depth remaining on the ground at the end of month was 5.0. Snowfall over eighteen inches was reported as follows: Husted, 23; Palmer Lake, 22; Boulder Cañon, 19; and Loveland, 18.5.—*Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Corporal, Signal Corps, assistant.*

DAKOTA.

The monthly mean temperature was about 2 above the normal for the state. The monthly average precipitation was about 1.19 below the normal for the state. The weather has been very favorable for fall farm work, which is probably farther advanced than for the past six years.

SUMMARY.

Temperature.—Monthly mean, 46.2; highest monthly mean, 51, at Spearfish; lowest monthly mean, 40, at Saint Vincent, Minn.; maximum, 94, at Steele, 8th; minimum, 9, at Saint Vincent, Minn., 21st; range for state, 85; greatest local monthly range, 78, at Steele; least local monthly range, 28, at De Smet.

Precipitation.—Average for the state, 0.41; greatest monthly, 2.12, at Valentine, Nebr.; least monthly, trace, at Bismarck, Napoleon, and New England City; greatest daily, 1.60, at Valentine, Nebr.; least daily, trace, at Bismarck, Napoleon, and New England City.—*S. W. Glenn, Sergeant, Signal Corps, Huron, in charge.*

ILLINOIS.

SUMMARY.

Temperature.—Monthly mean, 49.7; maximum, 88, at Hilton, 10th, at Jordan Grove, 12th, and at Quincy, 7th; minimum, 18, at Mount Morris, 28th; mean of maximum temperature, 81.6; mean of minimum temperature, 27.3; monthly mean of maximum and minimum temperatures, 50.9.

Precipitation—Average precipitation, 1.96; average number of cloudy days, eight; average number of fair days, seven; average number of clear days, sixteen.

Wind.—Prevailing direction, northeast.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

SUMMARY.

Temperature.—October, 1889, was the coolest October on record. Its mean temperature was nearly 4 below the normal; the mean temperature for October, 1873, 49.8, is nearly equal to that of 1889. October, 1879 and 1881, were the warmest, and 1889 and 1873 the coolest.

The first killing frost was noted at many stations on the 7th, and light frost occurred nearly every night during the month.

Precipitation.—The precipitation during the month was nearly one inch below the normal, and rain fell only on a few dates. The amounts in the southern portion of the state were slightly in excess of the normal for October, but the amounts in the central and northern portions were much below, most so in the latter. The heaviest rains occurred everywhere on the 22d; the amounts in the southern portion were the greatest, nearly 1.30, while in the northern portion only 0.50 fell on that date.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

IOWA.

October, 1889, was cold and fine, northeasterly winds prevailing. The mean temperature of the air was 1.5 below the normal. The coldest days were the 6th and 7th, being 12 below the normal; the warmest day was the 11th, being 14 above the normal.

The total rainfall at the central station was only 30 per cent. of the normal amount and the greater part of it fell during the last decade. In the state the total rainfall exceeded one inch in the southeastern fourth, from Montgomery to Delaware counties and down to Louisiana county. Over two inches fell in the extreme southeast, from Van Buren to Des Moines counties. In the entire northwestern half of the state, either no measurable rainfall occurred or less than a quarter of an inch was recorded. The greatest amount of rain fell generally on the 30th, and reached one inch in southeastern Iowa.—*Dr. Gustavus Hinrichs, Iowa City, director.*

IOWA WEATHER CROP BULLETIN SERVICE.

SUMMARY.

Temperature.—Monthly mean, 46.8; highest monthly mean, 52.2, at Omaha, Nebr.; lowest monthly mean, 43.0, at Elkader; maximum, 87, at Blakeville, 11th; minimum, 12, at Wesley, 20th; average maximum, 80.3; average minimum, 24.2; greatest local monthly range, 66, at Hampton; least local monthly range, 42, at Iowa City; monthly range for the state, 75; average monthly range, 56.1.

Precipitation.—Average for the state, 0.65; greatest, 2.88, at Keokuk; least, trace, at Blakeville, Independence, and Elkader; total amount of precipitation at this station, 0.52, which was 3.91 below the normal.

Wind.—Prevailing direction, southeast.—*G. M. Chappel, Sergeant, Signal Corps, Des Moines, in charge, Iowa Weather Crop Bulletin Service.*

KANSAS.

The month was divided in about two equal parts of very dissimilar weather; the first part being generally clear and quite pleasant, and the latter cloudy and wet.

SUMMARY.

Temperature.—The temperature is about normal from Jewell to Allen counties, then southwest to the southeast part of Chautauqua county; east of this line there is a deficiency which amounts to 2.1 in Shawnee. West of this line there is a slight excess.

Precipitation.—The month in the western and middle divisions was quite sharply defined into two dry and two wet periods, the latter occurring from the 12th to 17th and on the last three days of the month, and closing with the first snow storm of the season. The average precipitation for the western division was 2.39; for the middle division, 2.88; and for the eastern division, 1.84. There is a deficiency in the eastern division which in its central counties amounts to nearly 2.00. The deficiency extends west through the northern half of the northern tier of counties to Rawlins, and includes Cheyenne, Sherman, Wallace, and the lower part of Rawlins. An excess covers the central and southwestern counties, culminating in Barton and Russell counties where it amounts to 4.00.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

SUMMARY.

Temperature.—The average temperature for the state for October, as deduced from the tri-daily observations, was 52.2; from the average of the mean maximum and mean minimum temperatures, 53.4. These figures are about 5 less than the normal temperature for the month. The highest temperature recorded was 86 at Murray, 11th, and the lowest 23 at Ashland, 8th. The warmest days of the month were the 11th and 12th, and the coolest, the 7th and 8th. On the latter dates the first killing frosts of the season occurred. They were general throughout the state, but slight damage resulted from them as most of the crops had been housed, and ample warning was given of their approach, thereby enabling farmers to take precautionary measures for the safety of crops yet remaining uncut. On the 14th, 17th, 29th, and 30th light frosts were reported throughout the state.

Precipitation.—The average precipitation for the month was 2.33. This amount was about 3.00 less than the normal for the month. The greatest rainfall reported for the month, 4.25, occurred at Ashland, and the least, 0.48, at South Fork. But little fell previous to the 22d. At Louisville on October 31st, the monthly deficiency was 3.62, and the total deficiency since January 1st was 14.39. This would indicate that only about 70 per cent. of the normal amount of precipitation has fallen this year in this state.

Wind.—Prevailing direction, north.—*Dr. E. A. Grant, Louisville, director, Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

The usual October rainfall is the lightest monthly fall during the year, averaging 3.46 in the northern section and 2.80 in the southern section. The amount received during October, 1889, averaged but 0.40 in the north and 0.11 in the south. In consequence of the drought fall gardens are a complete failure. The weather during the month was excellent for rice harvesting and cotton picking.

SUMMARY.

Temperature.—Monthly mean, 66.4; highest monthly mean, 71.8, at Cameron; lowest monthly mean, 63.2, at Coushatta; maximum, 100, at Cameron, 15th; minimum, 31, at Plaquemine, 27th; range for the state, 69; greatest local monthly range, 60, at Cheneyville; least, 31, at Shell Beach; mean daily range, 28.9.

Precipitation.—Average for the state, 0.22; for the northern section, 0.40; southern section, 0.11; greatest local monthly rainfall, 1.06, at Shreveport; least, 0.00, at many stations.

Wind.—Prevailing direction, north.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The features of the month were the continued drought; the low, steady temperatures which prevailed, and the fact that in the central portion of the state the little rain that fell occurred either during the night or after sunset.

SUMMARY.

Temperature.—The mean temperature for the month, 47.2, is 6.2 below the normal of fourteen years. The temperature was below the normal every day of the month, except the 11th, when it was normal. The highest mean daily temperature, 53, occurred on the 11th, when the temperature was normal, and the lowest, 33, on the 23d, when it was 10 below the normal. The greatest departure from the normal was 18, on the 7th. The highest mean daily temperature in the past fourteen Octobers, 72, occurred on the 1st, 1878, and on the 6th and 7th, 1879, and the lowest, 30, on the 29th, 1884 and 1887. The highest mean monthly temperature, 57.6, occurred in 1879, and the lowest, 42.7, in 1889. Nearly all stations record the highest monthly tempera-

ture in 1879, and the lowest in this year, 1889. The monthly mean temperature is 1.4 below the lowest temperature recorded in the past fourteen years, the next lowest being 44.1, in 1887. The maximum temperature for the month, 80, occurred on the 11th, at Adrian, and the lowest, 8, on the 23d, at Roscommon.

Precipitation.—The average rainfall for the month, 0.95, is 2.18 below the average of fourteen years. The rainfall was below the average in all sections, from 2.85 in the upper peninsula to 1.72 in the southern section. The departure from the average in the central section was 2.28, and in the northern section 1.82. The average rainfall for October in the state is 3.13, and the largest amount recorded at any station was 1.86, at Sault de Ste. Marie, and the least, 0.20, at North Aurelius, Ingham Co. With the exception of Monroe county, and portions of Macomb, the rainfall averaged from 1.00 to 1.25 along the east side of the state, extending into the upper peninsula, and also the counties of Lenawee, Hillsdale, Branch, extreme west portion of Jackson, Calhoun, southern portion of Eaton, Allegan, Kalamazoo, Cass, Saint Joseph, Van Buren, and Berrien received a rainfall of more than one inch, while the counties north and west of the above outlined counties received less than one inch of rainfall during the month. The average number of rainy days during the month was 4.5.

Wind.—Prevailing direction, northwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

The precipitation was only about 6 per cent. of the normal. In the counties of the Red River Valley the temperature was from normal to 1 above, while in other portions of the state there was a deficiency of from 2 to 4.

SUMMARY.

Temperature.—Monthly mean, 42.7; highest monthly mean, 45.8, at Mankato; lowest monthly mean, 36.2, at Pine River; maximum, 82, at Saint Charles, 11th; minimum, 9, at Saint Vincent, 21st; range for state, 73; greatest local monthly range, 68, at Saint Vincent; least local monthly range, 45, at Duluth; greatest daily range, 44, at Moorhead, 18th; least daily range, 2, at Duluth and Moorhead, 24th and 25th.

Precipitation.—Average for the state, .09; greatest, .34, at Duluth; least, trace, at Pine River Dam.

Wind.—Prevailing direction, south.—*John Healy, Private, Signal Corps, Saint Paul, in charge.*

MISSISSIPPI.

SUMMARY.

Temperature.—The mean temperature was 62.7, which is 2.5 below the normal. There were three distinct maxima and three minima during the month. Light frosts occurred over the state at each of the three periods of minimum temperature. The daily range of temperature was generally large, as there were over twenty almost cloudless days. The greatest local monthly range of temperature was at Port Gibson, from 94 on the 1st to 30 on the 28th, and the least at Pearlington, from 86 on the 1st to 48 on the 8th and 16th. The highest monthly mean temperature was 70.2, at Pearlington, and the lowest, 53.6, at Ripley. Heavy frost was reported throughout the northern section on the 28th, and ice on that date at Kosciusko and Batesville. Such tender plants as tomatoes, beans, and squash vines survived the month even in the northern parts of the state.

Precipitation.—The average number of days on which rain fell was two; and the average amount for the state was only 0.26, which is 2.52 less than the normal for October. This deficiency added to that at the beginning of the month makes the deficiency since January 1st, 12.71. Eight stations report that no rain fell; 0.75 fell at Meridian, and at Memphis, Tenn., and it was the largest monthly rainfall reported.

Wind.—Prevailing direction, north.—*R. B. Fulton, Signal Corps, University, director.*

METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

SUMMARY.

Temperature.—Monthly mean, 54.2; highest monthly mean, 59.7, at New Haven; lowest monthly mean, 50.3, at Excelsior Springs; maximum, 92, at Willow Springs, 4th; minimum, 22, at Excelsior Springs, 27th; range for state, 70; greatest local monthly range, 63, at Harrisonville and Willow Springs; least local monthly range, 47, at Cairo, Ill., and New Haven.

Precipitation.—Average for the state, 2.63; greatest, 6.03, at Wither's Mills; least, 0.73, at Harrisonville.

Wind.—Prevailing direction, northeast.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

MISSOURI.

SUMMARY.

Temperature.—The average temperature has ranged from 47.7 at Steelville and Harrisonville, to 59.2 at Protem and 59.1 at Lamonte. The lowest temperature of the month was 23, at Steelville. At fourteen stations out of twenty-four, reporting minimum temperatures, the minimum of the month was 32 or less. The highest temperature of the month was 91, at Protem. At the central station the temperature was 54.9, which is 1.2 below the average of Engelmann's series of forty-seven years. The lowest temperature observed was 35.9. In October, 1863, the lowest temperature reached was 19.5, on the 31st. The highest temperature observed during the month at the central station was 84. In 1867, October 2d, a temperature of 91 was observed by Engelmann. The month has therefore been fairly representative of the normal conditions in Missouri.

Precipitation.—The rainfall during October, 1889, has been normal in quantity. Nearly all of the rainfall occurred after the 20th. In northeastern Missouri, over a small area around Hannibal and Louisiana, the fall exceeded 6.00, diminishing towards the southern and western parts of the state to less than 2.00. During the ten years ending December, 1887, the average October rainfall in Missouri is 3.1; ranging from 2.1 to 4.5.—*Prof. Francis E. Nipher, Saint Louis, director.*

NEBRASKA.

The temperature has been on the whole a little lower than usual, with a rather wide range between the highest and lowest, yet with less than the usual number of freezing days. The precipitation has been less than the normal.

SUMMARY.

Temperature.—The temperature during the month was very uniform throughout the state; the highest temperature occurred at the opening of the month and reached 91, at Alliance, and the lowest on the 20th and 26th, with a minimum of 11, at Ansley. The maximum is higher than for any October since 1879, and the minimum has been lower but once, in October, 1887.

Precipitation.—The precipitation exceeded 2.00 only at Valentine and Falls City, in the extreme northern and southeastern parts of the state. A fall of snow occurred at the close of the month, amounting to a depth of six inches in the western portion of the state. The number of rainy days is less than usual, but the number of cloudy days is greater.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

NEVADA.

SUMMARY.

Temperature.—The temperature during the month was about normal. The average, as deduced from 26 reports, is 52.2. There was an average of ten cloudless, nine partly cloudy, twelve cloudy, and six rainy days. The highest temperature reported was 103.0, at El Dorado Canyon, 4th, and the lowest temperature was, 14, at Ely, 28th. The highest temperature at nearly all stations occurred on the 4th. The three last days of the month were very cold all over the state. Frosts were general all over Nevada on the 8th to 11th, and from the 24th to 31st.

Precipitation.—The rainfall during the month was unusually heavy in all counties except in the southeastern portion of Humboldt county, and in Storey and Churchill counties. It was well distributed throughout the state, as will be shown by the fact that an average of 1.48 fell in the state. The average rainfall for the state, 1.48, is 1.11 higher than that of October, 1888, and 0.56 in excess of the normal. Nearly all of the precipitation reported was in the form of rain. Snow fell at Tuscarora, Burner's Ranch, Eureka, and Virginia City, ranging in amount from two to eleven inches. There was no snow on the ground at any of the stations on the last day of the month.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

October was cold and wet. The mean temperature was about 3 below the normal for the month, and this deviation was general throughout New England. The amount of precipitation was about 1.00 above the normal; there was a small deficiency in the north but the rains in the south were frequent and heavy.

SUMMARY.

Temperature.—Monthly mean, 46.1; highest monthly mean, 52.2, at Olneyville; lowest monthly mean, 33.2, at Weathersfield Centre; maximum, 80, at Olneyville, 20th; minimum, 6, at Berlin Falls, 24th, 0 at Weathersfield Centre (elevation 1800 feet), 23d; range for New England, 74; greatest local monthly range, 64, at Weathersfield Centre; least local monthly range, 27, at Nantucket; greatest daily range, 51, at Weathersfield Centre, 20th; least daily range, 1, at Walpole and Lunenburgh, 6th and 7th. The average temperature for October for 25 stations, having records for more than 10 years, is 49.8; the average for October, 1889, is 46.8; departure, —3.0.

Precipitation.—Average for New England, 4.53; greatest, 6.58, at Nantucket; least, 2.90, at Stratford. The average precipitation for October for 34 stations, having records for more than 10 years, is 3.84; the average for October, 1889, is 4.35; departure, +0.51.

Wind.—Prevailing direction, northeast.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; L. G. Schultz, Sergeant, Signal Corps, assistant.*

NEW JERSEY.

SUMMARY.

Temperature.—The mean temperature for October, 1889, 50.8, is 3.5 below the average for the month, and 1.6 above the average for the corresponding month of 1888; highest monthly mean, 55.8, at Readington; lowest monthly mean, 45.1, at Hanover; maximum, 82.0, at Beverly, 12th; minimum, 23.0, at Hanover, 22d; range for state, 59.0; greatest local monthly range, 50.0, at Beverly; least local monthly range, 34.0, at Atlantic City; greatest daily range, 36.0, at Allaire and Gillette, 11th, 3d, and 5th, respectively; least daily range, 4.0, at Oceanic, 14th.

Precipitation.—The average precipitation for the state, 3.80, is 0.61 above the average determined from past records of forty-eight stations, and 0.93 above the average for the corresponding month of 1888; greatest, 5.03, at Hopewell; least, 2.42, at Newark. Average number of days on which precipitation equalled 0.01 inch, or more, 11.4.

Wind.—Prevailing direction, northwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

NEW YORK.

SUMMARY.

Temperature.—The highest temperature reported was 75, at Middleburgh, on the 1st; and the lowest was 11.5, at Angelica, on the 24th. The mean temperature for the state was 43.7; the 1st being the warmest and the 23d the coldest day. The greatest local monthly range of temperature was 58, at Middleburgh; and the least was 33, at Setauket. The temperature was generally below the average.

Precipitation.—The average precipitation for the state was 3.52, or considerably below the normal. The greatest deficiencies reported were: 1.97, at North Hammond; 1.82, at Alfred Centre; 1.89, at Brooklyn; 1.14, at Humphrey; and 1.13, at Cooperstown. The greatest excesses of rain were, at Potsdam, 1.08, and at Factoryville, 1.30. The greatest monthly rainfall was 8.32, at Hess Road Station; and the least, 1.76, at Brooklyn. The average number of days on which 0.01 of an inch, or more, of rain or snow fell was 11.4. Snow was reported from eighteen stations, at seven of which the fall was too small to be measured. The greatest monthly depth of snowfall was 2.00, at Humphrey.

Wind.—Prevailing direction, north.—*Prof. E. A. Fuertes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

NORTH CAROLINA.

The temperature was decidedly below the average, the departure below the normal amounting to 4.5. The highest temperature generally occurred on the 1st. The first killing frost was reported over nearly the whole state on the 8th and 9th, causing some damage to cotton. Thin ice formed in places.

SUMMARY.

Temperature.—The monthly mean for the state, 58.1, is 4.5 below the average; maximum, 87, at Clarkton, 1st; minimum, 26, at Hot Springs, 8th; range for the state, 61; the highest monthly mean temperature was 64.0, at Southern Pines, and the lowest monthly mean, 52.6, at Asheville; average monthly range, 45.6; greatest monthly range, 57.0, at Clarkton; least monthly range, 32, at Hatteras.

Precipitation.—The average precipitation for the state, 3.06, is 0.77 below the average. The rainfall was in excess in the eastern portion of the state and deficient in the central and western portions. The greatest monthly rainfall, 7.56, was recorded at Norfolk, Va., and the least, 0.45, at Franklin.

Wind.—Prevailing direction, north; the average direction for October, as deduced from many years observations, northeast.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Sergeant, Signal Corps, assistant.*

OHIO.

SUMMARY.

Temperature.—The mean for the state, 47.9, was 3.2 below the average. The maximum temperature reported was, 82.0, at Georgetown, on the 11th; minimum, 17.1, at Wauseon, on the 26th. The mean daily range of temperature was 19.4. The greatest daily range was, 45, at Logan and Hanging Rock on the 11th; smallest, 2.5, at Newcomerstown and Wooster, on the 26th.

Precipitation.—The rainfall was below the average in all sections. The deficiency for the month in the northern section amounted to 0.90, in the middle section to 1.08, and in the southern to 0.31. The average deficiency for whole state was 0.77. The mean rainfall in the northern section was 1.46, in the middle section, 1.42, and in the southern section, 2.47. The mean for the state was 1.78. The greatest monthly rainfall was 3.71, at Hanging Rock, and the smallest, 0.50, at Wapakoneta. Light snow, the first of the season, was reported from stations in the northern and middle sections on the 7th, and from stations in the middle and southern sections on the 6th.

Wind.—Prevailing direction, north.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

OREGON.

SUMMARY.

Temperature.—The mean temperature of the state, 53.7, is 2.6 above the normal. The highest monthly mean, 57.2, occurred at Portland, and the lowest, 44.9, at Fort Klamath. Along the coast the mean averaged 56; in the interior valleys it ranged from 50 to 57; and in eastern Oregon from 45 to 56. The maximum temperature generally occurred on the 4th. In the eastern part of Malheur county and in southwestern Idaho, maximum temperature of 90 and more was recorded, and generally in the state it ranged from 70 to 80. The minimum generally occurred on the 15th, except in extreme eastern Oregon, where it occurred on the 29th to 31st. Along the immediate coast the minimum was from 40 to 44; in the interior valleys from 30 to 38; and in eastern Oregon from 20 to 37; the lowest, 20, was recorded at Jordan Valley and Fort Klamath. The least ranges of temperatures, 26 to 31, occurred along the coast, and the greatest, 71, in eastern Oregon.

Precipitation.—The precipitation was above the normal in the sections west of the Cascades, and nearly normal east of them. Average for the state, 4.60. Along the coast from 8.00 to 15.00 fell; in the interior valleys from 2.00 to 6.00; and in eastern Oregon from 0.78 to 2.00. The least, 0.78, was recorded at Beulah, and the greatest, 14.80, at Ellensburgh. Rain fell in the state on from four to nineteen days. Snow occurred in the mountain regions and on the high plateaus, where it fell to a depth of from 2.00 to 4.00.

Wind.—Prevailing direction, southwest.—*Hon. H. E. Hayes, Master State Grange, Roseburgh, director; B. S. Pague, Sergeant, Signal Corps, assistant.*

PENNSYLVANIA.

SUMMARY.

Temperature.—The mean temperature of fifty-nine stations was 47.2, which is about 4 below the average, and 1 above the month of October, 1888. The means of the daily maximum and minimum temperatures were 57.3 and 37.3, respectively. These give a mean temperature of 47.3, and an average daily range of 20.0. The stations that recorded the highest temperatures during the month were Coatesville, 83; Annville, 82; West Chester, 80; Lancaster, 80; and Westtown, 80. These occurred on the 12th. The lowest were Wellsborough, 13; Dyberry, 14; Columbus, 14; and Philipsburgh, 14. These occurred on the 24th, and are 3 below the coldest temperatures generally reached in October.

Precipitation.—The average rainfall for the month was 3.85, which is nearly normal. There was a small excess in the eastern portion of the state, and a small deficiency in the western. The largest totals were Eagle's Mere, 8.61; Reading, 5.74; Drifton, 5.74; Wellsborough, 5.61; Westtown, 5.73; Swarthmore, 5.29; and Quakertown, 5.23.

Wind.—Prevailing direction, northwest.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

SOUTH CAROLINA.

SUMMARY.

Temperature.—Monthly mean, 61.8; highest monthly mean, 65.4, at Port Royal; lowest monthly mean, 53.9, at Camden; maximum, 88.0, at Brewer's Mines and Chester, 12th, and at Hardeeville, 1st; minimum, 27.0, at Cedar Springs, 8th; range for state, 61.0.

Precipitation.—Average for the state, 1.65; greatest monthly, 3.91, at Camden; least monthly, 0.10, at Port Royal; greatest daily, 2.31, at Brewer's Mines, 26th and 27th.

Wind.—Prevailing direction, north.—*Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.*

TENNESSEE.

The principal features for the month were the small amount of rainfall and the early killing frosts.

SUMMARY.

Temperature.—The mean temperature was 56, a little below the October average for the past seven years. The highest local monthly mean was 60.8, at Memphis, and the lowest was 50.3, at Lynnville. The maximum temperature was 86, on the 4th, at Leeville, and on the 12th, at Milan, and the minimum was 26, on the 8th, at Riddleton, Nunnelly, and Hohenwald. The maximum temperature was recorded generally on the 12th, and the minimum on the 8th. The daily ranges of temperature were greater than usual in October. The low temperature during the first week resulted in killing frosts throughout the state on the 8th, which greatly injured the prospective yield of the cotton crop in the state. Frosts were variously reported on 20 days—several of them killing, notably those of the 7th, 8th, 9th, 15th, and 28th.

Precipitation.—The average depth of rainfall was 1.27; this was the smallest October rainfall during the past seven years, except that in 1886, which was only 0.97. Measurable rains were reported on fifteen days, but these for the most part were very light and local in character. There were only five days of general rains. The greatest monthly rainfall was 2.33, at Charleston, in the eastern division, and the least amount was 0.09, at Cog Hill.

Wind.—Prevailing direction, north.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

TEXAS.

SUMMARY.

Temperature.—The mean temperature for the month was from 2 to 4 above the normal over the central portion of eastern Texas and over the Panhandle, while over the remainder of the state the mean for the month corresponded very nearly with the normal, except in a few localities along the coast where it was 1 to 2 below. The mean temperature for the month was 65; the highest reported was, 98, at Hartley, 2d and 3d, and the lowest, 24, at the same station, 30th.

Precipitation.—The rainfall during the month was smaller over the agricultural portion of the state than has ever been recorded for that month, and only a few stations in the northern portion report as much as one inch. Over the Panhandle the rainfall was from 0.50 to 3.00 above the normal for the month, while over the remainder of the grazing portion of the state the rainfall was as light as over the agricultural portion.

Light frosts occurred as far south as Cuero in the western, and Palestine in the eastern portion of the state on the 27th.—*D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.*

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, October, 1889.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Alabama.	°	°	°	*Ins.*
Bermuda *†.....	84	36	61.1	0.03
Columbiana †	85	33	59.6	2.12
Decatur (1) †.....	.....	.....	.....	0.66
Decatur (2)†.....	82	32	57.8	1.00
Double Springs	90*	27	59.6	1.41
Elkmont†.....	79	31	58.7	1.50
Eufaula	84	40	61.9	2.30
Evergreen †.....	88	33	62.9	1.40
Fayette C. H. †.....	81	33	57.0	1.00
Fort Deposit†.....	85	38	64.4	1.54
Gadsden †.....	82	32	58.1	.....
Greensborough †...	86	40	64.7	0.37
Livingston (1).....	86	35	60.6	0.19
Livingston (2)†.....	88	32	62.8	0.30
Marion †.....	86	32	60.9	1.36
Mount Willing†*...	84	39	63.4	1.00
Mt. Vernon B'ks....	92	38	65.6	0.23
Pine Apple†.....	90	32	61.4	0.10
Selma (2) †.....	88	36	63.2	0.60
Tuscumbia (1).....	83	37	57.0	0.17
Tuscumbia (2) †...	86	28	57.3	0.10
Union Springs	87	38	.....	0.27
Uniontown.....	87	39	65.4	0.35
Valley Head †.....	90	27	53.8	1.33
Wiggins.....	88	36	.....	0.45
Arizona.				
Antelope Valley ...	.....	.....	.....	2.35
Ash Canyon †	.....	.....	.....	2.30
Ash Creek	.....	.....	.....	1.89
Ash Springs.....	.....	.....	.....	0.63
Banghart's.....	.....	.....	.....	0.90
Benson *.....	90	52	65.8	0.05
Bisbee	.....	.....	.....	0.38
Buckeye	.....	.....	.....	0.96
Casa Grande*.....	109	53	76.7	0.80
Cooley's Springs†...	.....	.....	.....	0.12
Dos Cabezos.....	.....	.....	.....	1.11
Eagle Pass	.....	.....	.....	1.15
Flagstaff†.....	79	21	46.4	1.69
Florence†.....	99	35	68.6	0.44
Fort Apache	87	21	56.3	0.56
Fort Bowie	81	46	62.9	0.74
Fort Huachuca	84	40	62.0	0.04
Fort Lowell.....	101	35	68.8	0.34
Fort McDowell	106	38	70.3	1.17
Fort Mojave.....	107	40	71.0	0.65
Fort Verde	97	30	61.0	1.75
Gila Bend*.....	104	54	72.3	1.50
Globe †.....	89	36	63.8	1.94
Holbrook*.....	89	28	60.4	0.49
Lochiel*.....	83	43	60.3	0.55
Maricopa*.....	93	50	71.5	1.20
Mount Huachuca †.	89	40	65.2	0.63
New River †.....	100	37	68.5	1.70
Pantano *.....	91	55	65.0	0.04
Phœnix	100	41	70.2	1.33
Saint John's*.....	86	.....	.....	T.
San Carlos.....	98	34	67.3	0.71
Signal †.....	101	40	69.4	0.56
Strawberry †.....	.....	.....	.....	2.74
Teviston	.....	.....	.....	0.60
Texas Hill*.....	110	60	75.4	0.10
Tip Top †.....	.....	.....	.....	2.97
Tucson (1)†.....	95	42	68.9	0.36
Tucson (2)*.....	92	59	76.1	?
Wilcox*.....	98	39	66.7	0.80
Williams	82	20	51.2	.....
Winslow †.....	86	34	61.8	0.42
Yuma*.....	98	61	73.7	0.06
Arkansas.				
Arkansas City †....	.....	.....	.....	0.52
Camden †.....	84	35	64.3	0.98
Conway	86	35	58.1	1.05
Devall's Bluff †....	86	20	56.8	0.09
El Dorado †.....	82	34	59.9	0.46
Forrest City †.....	86	38	63.6	0.65
Fulton†	.....	.....	.....	1.30
Heber.....	84	31	56.7	3.25
Helena (1) †.....	.....	.....	.....	0.53
Helena (2) †.....	84	34	60.3	.....
Hot Springs.....	89	45	66.2	1.35
Lead Hill.....	91	32	59.2	3.88
Little Rock B'ks...	86	32	61.3	2.36
Lonoke	84	38	63.1	1.50
Malvern †.....	82	52	63.6	3.64
Monticello †.....	86	34	64.3	0.52
Newport (1)†.....	.....	.....	.....	2.43
Newport (2)†.....	82	30	57.6	1.12
Osceola †.....	86	33	55.4	0.96
Ozone †.....	80	41	55.8	5.19
Pine Bluff†.....	84	34	62.6	0.55
Prescott †.....	80	36	62.4	0.14
Russellville †.....	86	32	60.5	2.40
Stuttgart †.....	81	30	58.8	0.99
Texarkana†.....	90	32	66.8	1.01
Washington †.....	87	33	65.1	1.83
Winslow†.....	80	40	57.8	4.57
British Columbia.				
New Westminster.	71	39	52.7	4.83
California.				
Alcade *.....	85	45	64.9	4.95
Alcatras Island	84	51	60.1	7.81
Almaden*.....	.....	.....	.....	5.66

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
California—Cont'd.	°	°	°	*Ins.*
American Hill*....	92	41	57.1	11.20
Anaheim*.....	88	52	65.4	2.31
Angel Island.....	93	46	61.3	7.86
Antioch *	88	48	62.8	4.51
Aptos*.....	85	45	60.7	7.49
Athlone *.....	101	43	65.9	3.59
Auburn *.....	95	45	61.7	5.75
Bakersfield *.....	90	52	67.0	?
Barstow †.....	97	35	64.4	0.23
Belmont *.....	87	46	62.4	.....
Benicia Barracks ..	88	45	61.4	5.07
Berendo *.....	98	46	67.6	3.67
Berkeley	82	47	59.4	5.80
Boca *.....	69	22	43.5	1.50
Boulder Creek*.....	90	39	54.2	19.68
Brentwood*.....	92	45	68.3	4.66
Brighton*.....	98	45	65.0	6.04
Byron*.....	90	48	63.6	4.52
Cactus*.....	115	58	79.4	0.70
Caliente *.....	91	43	67.9	1.35
Calistoga *.....	90	40	57.9	9.85
Castroville*.....	85	45	60.7	4.31
Centreville *.....	95	52	65.5	4.30
Chico *.....	98	50	64.2	7.80
Cisco *.....	76	32	45.6	11.72
Colgrove	.....	.....	.....	7.76
Colfax *.....	92	40	57.1	9.95
Colton *.....	102	48	67.0	1.59
Corning*.....	98	47	61.0	5.74
Crescent City	.....	.....	.....	13.76
Davisville*.....	95	49	64.3	8.14
Delano *.....	101	48	66.9	2.46
Delta*.....	91	40	58.8	26.71
Downey *.....	84	50	65.8	3.66
Dunnigan*.....	85	50	64.0	6.39
Edgewood *.....	70	37	51.8	7.80
El Dorado *.....	96	42	61.5	7.46
Elmira*.....	100	46	64.1	6.54
El Verano *.....	86	44	59.9	9.73
Emigrant Gap *....	78	32	48.1	11.81
Esperanza *.....	88	48	61.5	6.14
Evergreen	.....	.....	.....	3.07
Farmington*.....	99	43	64.2	2.82
Felton *.....	90	38	59.6	16.91
Ferndale.....	.....	.....	.....	8.56
Florence *.....	83	50	65.4	4.04
Folsom *.....	95	47	63.0	6.18
Fort Bidwell.....	84	28	50.3	3.61
Fort Gaston	85	33	55.6	7.31
Fort Mason.....	84	49	60.3	7.04
Fresno *.....	106	50	69.0	3.10
Fruto*.....	90	45	63.5	8.81
Georgetown†.....	90	39	56.3	10.45
Gilroy *.....	89	42	61.1	5.36
Girard *.....	95	45	60.3	1.97
Glen Ellen *.....	92	42	59.6	11.26
Goshen *.....	100	47	66.7	4.76
Grass Valley.....	.....	.....	.....	12.49
Hollister *.....	97	40	61.4	2.91
Hornbrook*.....	90	40	54.7	1.95
Hydesville †.....	76	40	56.2	7.92
Indio *.....	118	50	75.7	0.60
Ione *.....	94	40	62.6	4.71
Iowa Hill*	92	43	57.9	9.20
Jolon	.....	.....	.....	7.38
Julian†	93	45	63.5	3.34
Keeler*.....	91	43	61.5	0.56
Keene *.....	94	42	60.5	2.23
Kingsburgh *.....	90	45	65.4	3.73
King City*.....	90	38	55.7	4.17
Knight's Landing*..	82	46	63.6	5.28
Lathrop *.....	93	45	63.3	2.59
Laurel *.....	94	42	61.1	20.48
Lemoore*.....	97	53	66.8	3.39
Livermore *.....	94	43	62.4	3.94
Livingston *.....	95	44	61.5	2.74
Long Beach*.....	80	50	67.5	.....
Los Angeles*.....	85	48	66.1	7.34
Los Banos *.....	96	45	64.8	0.86
Los Gatos (1)*.....	91	43	63.5	10.85
Los Gatos (2)	.....	.....	.....	11.89
Mammoth Tank *..	108	55	77.4	0.17
Menlo Park*.....	88	44	61.3	4.96
Merced *.....	95	42	63.2	1.61
Modesto *.....	92	51	63.2	1.79
Mojave *.....	116	48	66.3	2.21
Montague *.....	76	50	58.8	3.20
Monterey *.....	78	44	64.4	4.28
Monterey *(Hotel del Monte).....	85	50	61.6	.....
Mount Hamilton...	85	34	50.5	4.38
Napa*.....	81	45	58.8	5.32
National City*†....	83	47	64.5	2.60
Needles.....	100	44	72.1	0.25
Newark *.....	88	46	63.5	4.40
Newman *.....	90	48	61.5	4.28
Niles *.....	87	45	63.5	4.48
Norwalk *.....	86	54	65.4	2.61
Oakland (1).....	87	45	61.1	7.30
Oakland (2)*.....	76	48	61.1	7.20
Orland *.....	95	47	64.2	7.96
Oroville *.....	90	44	64.1	7.41
Pajaro *.....	94	40	59.9	5.61

Meterological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
California—Cont'd.	°	°	°	*Ins.*
Paso Robles*.....	95	39	59.2	5.61
Petaluma*.....	90	45	61.1	9.33
Placerville*.....	95	40	58.9	8.85
Pomona*.....	90	55	71.0	3.73
Presidio of San F...	87	48	58.9	6.87
Puente *.....	94	49	66.4	3.10
Red Bluff*.....	98	48	63.2	8.39
Redding *.....	86	41	58.8	15.13
Riverside	93	43	61.6	1.28
Rocklin *.....	95	45	65.0	4.97
Rumsey *.....	88	49	62.3	7.90
Sacramento (1).....	83	36	55.6	7.01
Sacramento (2)*....	86	47	61.4	5.62
Salinas (1)*.....	94	44	58.9	4.20
Salinas (2)*.....	68?	42	58.4	3.42
Salton *.....	109	50	74.2	0.15
Sanger Junction*...	102	44	66.3	4.39
San Ardo*.....	99	41	61.3	4.74
San Diego B'ks	80	52	65.8	1.35
San Fernando*.....	91	42	63.9	6.17
San Gabriel *.....	88	54	69.4	6.14
San José *.....	86	46	61.5	4.48
San Mateo *.....	84	46	57.4	5.98
San Miguel*.....	97	44	61.7	3.90
San Pedro *.....	82	57	68.4	3.56
Santa Ana *.....	88	54	66.7	1.88
Santa Barbara (1)..	85	50	63.9	8.65
Santa Barbara (2)*.	78	52	67.0	10.50
Santa Clara	84	44	61.4	4.88
Santa Cruz*.....	90	47	61.9	9.50
Santa Margarita*...	92	37	60.4	10.85
Santa Maria.....	88	42	63.3	7.53
Santa Monica*.....	83	54	67.6	5.87
Santa Paula*.....	88	54	67.2	6.28
Santa Rosa*.....	82	44	60.3	8.78
Seven Palms*.....	110	60	78.3	0.53
Shingle Springs * ..	90	45	65.2	8.73
Sims*.....	89	35	54.7	28.57
Sisson *.....	78	29	47.3	16.45
Soledad*.....	88	40	58.9	3.00
Sonoma	82	42	61.5	9.09
Soquel *.....	90	42	63.6	.....
South Side *.....	96	52	62.7	2.18
South Vallejo *.....	83	45	58.1	4.85
Spadra *.....	98	48	64.7	3.64
Steeles.....	91	45	62.6	9.10
Stockton (1).....	.....	.....	.....	3.39
Stockton (2) *.....	80	55	64.9	0.98
Summit *.....	72	27	42.1	5.65
Suisun City *.....	98	42	60.5	6.47
Susanville*†.....	80	28	49.0	4.18
Tehachapi *.....	84	36	55.8	2.70
Tehama *.....	72	48	60.3	?
Templeton *.....	95	41	60.7	8.57
Towles *.....	87	40	56.8	.....
Tracy *.....	99	49	65.5	3.02
Traver *.....	98	50	67.8	4.65
Tropico *.....	88	47	64.5	.....
Truckee *.....	80	24	46.3	3.13
Tulare *.....	102	50	66.6	4.17
Turlock *.....	87	45	61.8	2.65
Upper Mattole.....	82	40	57.6	18.92
Vacaville (1).....	95	48	62.9	8.52
Vacaville (2)*.....	88	50	63.6	7.98
Valley Springs*.....	91	48	63.6	4.50
Vina *.....	84	46	60.9	7.24
Volcano Springs *..	113	56	78.5	0.13
Walla Walla Creek*	83	33	51.9	3.95
Westley *.....	92	50	67.2	2.65
Whittier *.....	90	50	68.4	3.21
Williams *.....	76	49	59.1	4.00
Willow (1)†.....	92	42	58.6	7.14
Willow (2)*.....	93	47	60.7	6.83
Winters *.....	98	50	66.9	5.95
Woodland *.....	84	45	58.9	5.32
Canada.				
McGill Col. Observatory, Montreal.	61	22	40.2	3.42
Colorado.				
Agate *.....	90	20	47.6	1.00
Alma	68	8	36.7	0.53
Apishapa *.....	88	20	52.3	1.70
Aroya	.....	.....	.....	0.25
Aspen *.....	73	17	41.0	0.86
Breckenridge	88	7	46.8	0.95
Boulder Canon.....	.....	.....	.....	1.85
Brush	.....	.....	.....	2.12
Byers *.....	88	32	50.3	0.74
Cheyenne Wells *..	88	30	54.0	.....
Climax*.....	62	6	34.2	1.56
Cumbres.....	.....	.....	.....	1.10
Deer Trail *.....	90	22	47.0	.....
Delta †.....	85	31*	46.6	0.57
Denver (Jes. Col)..	81	20	51.4	3.08
Dolly Varden Mine.	54	0	28.8	1.70
Durango †.....	.....	.....	.....	3.10
Eagle Farm.....	.....	.....	.....	5.50
Elkhorn	.....	.....	.....	2.65
Emma.....	.....	.....	.....	0.51
First View *.....	86	32	52.8	1.35
Fort Collins	85	25	44.6	3.16
Fort Crawford	85	25	51.7	0.44
Fort Lewis	77	19	47.4	2.28
Fort Logan	89	23	52.6	2.90
Fort Lyon.....	93	17	53.8	2.46

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Colorado—Cont'd.	°	°	°	*Ins.*
Fort Morgan	.....	.....	.....	0.86
Fraser †.....	.....	1	35.9	0.44
Fruita *.....	84	28	52.0	.....
Georgetown.....	70	20	44.7	1.59
Glenwood Springs .	89	27	49.0	1.53
Greeley	82	20	50.2	1.92
Gunnison	82	17	40.5	T.
Hardin.....	.....	.....	.....	1.47
Hugo *.....	82	28	48.4	.....
Husted	85	21	48.4	2.03
Lamar *.....	95	32	52.4	2.39
La Porte.....	.....	.....	.....	2.74
Las Animas.....	91	27	57.1	1.08
Leadville	66	15	38.1	0.69
Le Roy	.....	.....	.....	0.37
Livermore	.....	.....	.....	3.82
Longmont†.....	91	20	50.0	3.24
Loveland	.....	.....	.....	1.85
Magnolia *.....	100	23	52.2	3.40
Middle Box Elder..	.....	.....	.....	3.91
Monte Vista	78	12	45.3	0.64
Moraine	.....	.....	.....	1.57
Palmer Lake.....	84	19	47.9	3.18
Paoli.....	89	29	49.6	0.95
Parachute	.....	.....	.....	1.05
Pike's Peak.....	51	— 9	24.0	.....
Rifle Falls *.....	78	26	47.1	1.11
Rocky Ford.....	91	27	54.0	1.68
San Luis Ex. Sta	83	9	46.8	0.55
Sedgwick	.....	.....	.....	0.73
T. S. Ranch	80	21	52.8	1.04
Thon	78	19	48.2	0.51
Upper Pine	.....	.....	.....	2.24
Villa Grove.....	.....	.....	.....	1.35
Wigwam.....	.....	.....	.....	1.86
Connecticut.				
Canton	70	23	.....	4.29
Clark's Falls.....	.....	.....	.....	5.13
Colchester.....	71	28	48.2	.....
Falls Village.....	.....	.....	.....	3.55
Fort Trumbull	75	31	51.4	4.99
Hartford (1)	64	24	47.8	6.35
Hartford (2).....	.....	.....	.....	6.38
Lebanon	.....	.....	.....	5.86
Mansfield	68	27	45.8	5.52
Middletown	70	24	47.2	5.47
New Britain	.....	.....	.....	4.97
New Hartford (1)*.	67	18	38.1	3.96
New Hartford (2)..	.....	.....	.....	4.09
Newington	.....	.....	.....	5.56
North Woodstock..	.....	.....	.....	4.20
Shelton	70	30	47.4	3.89
Southington*.....	70	27	47.2	4.58
South Manchester .	.....	.....	.....	5.41
Stevenson	.....	.....	.....	4.37
Thompson*.....	69	28	45.4	.....
Uncasville.....	.....	.....	.....	6.56
Voluntown *.....	68	30	48.5	4.37
Wallingford	.....	.....	.....	4.45
Waterbury.....	72	27	47.9	4.03
West Simsbury.....	.....	.....	.....	4.01
Dakota.				
Canton	78	27	49.1	.....
Clark	85	19	46.1	0.40
Davenport	73	19	44.2	0.02
De Smet *.....	.....	28	41.5	0.10
Fort A. Lincoln....	83	23	46.0	0.00
Fort Bennett	89	19	49.7	0.04
Fort Buford	88	15	47.2	0.01
Fort Meade	86	22	51.1	1.71
Fort Pembina.....	78	10	41.5	0.30
Fort Randall.....	79	18	51.0	0.00
Fort Sully	87	21	51.4	0.06
Fort Totten	82	21	44.9	T.
Fort Yates	.....	23	.....	0.10
Gallatin	80	18	38.0	.....
Kimball	77	19	43.8	0.50
Napoleon	82	20	44.3	T.
New England City§.	85	12	38.8	T.
Onida *.....	82	22	45.8	.....
Roscoe d.....	78	18	45.2	.....
Spearfish *.....	85	22	51.0	1.72
Steele	94	16	47.6	0.06
Wahpeton	81	19	44.6	0.00
Webster	81	15	48.3	0.63
Wolsey *.....	74	14	43.8	0.34
Woonsocket	77	14	44.2	0.40
Delaware.				
Kirkwood *.....	.....	32	48.0	.....
District of Columbia.				
Washington B'ks ..	79	33	52.9	4.62
Florida.				
Altamonte Springs†	94	48	70.4	0.37
Alva †.....	91	44	72.6	0.58
Archer †.....	95	37	67.5	2.14
Fort Barrancas.....	88	44	67.8	1.27
Fort Meade*.....	86	43	65.8	0.20
Homeland *.....	89	46	71.4	0.15
Lake City †.....	91	38	65.0	1.25
Live Oak†.....	88	40	64.4	0.00
Madison *†.....	92	45	72.2	0.19
Manatee †.....	84	48	67.6	1.21
Matanzas *.....	84	41	65.0	0.64
Merritt's Island †..	89	54	73.8	1.33
St. Francis B'ks ...	84	47	67.4	0.64

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Florida—Cont'd.	°	°	°	*Ins.*
Tallahassee	89	43	67.2	0.75
Villa City †*	92	53	71.1	0.81
Georgia.				
Albany †	81	49	66.2	0.00
Allapaha †	89	36	63.1	1.75
Athens (1)	80	38	59.6	2.10
Athens (2) †	80	34	59.4	2.14
Bainbridge †	92	40	66.4	0.90
Camak †	88	36	62.2	1.69
Cartersville †	81	33	58.4	1.42
Diamond *	.....	42	55.8	1.45
Duck †	75	25	53.6	1.80
Forsyth *	92	44	65.7	3.12
Fort Gaines †	96	64?	78.9?	0.00
Fort McPherson	84	34	60.0	1.96
Gainesville †	78	34	58.8	1.40
Gillsville *	81	41	63.3	.....
Griffin †	84	38	62.3	3.03
Hephzibah *	84	44	63.6	1.20
Jesup †	87	39	63.6	1.31
Macon †	88	40	64.0	1.95
Marietta †	80	33	56.5	1.50
Milledgeville * †	84	37	60.8	1.65
Millen †	88	34	63.2	1.72
Monticello †*	.....	44	57.6?	2.88
Newnan †	78	30	57.9	2.35
Perry *	.....	47	62.2	2.22
Point Peter *	.....	38	57.6	1.85
Quitman (1) *	85	44	64.2	1.00
Quitman (2) †	92	40	67.1	0.75
Thomasville (1)	90	39	64.8	1.02
Thomasville (2) †	92	38	64.8	0.96
Toccoa †	80	32	59.0	0.77
Union Point †	84	28	60.1	1.04
Washington †	82	36	60.0	1.30
Waynesborough †	85	36	61.3	1.40
West Point †	84	42	63.8	2.52
Idaho.				
Boisé Barracks	85	26	52.8	1.24
Era †	89	20	50.6	0.97
Fort Sherman	85	30	50.8	1.07
Kootenai * †	86	29	49.0	0.74
Lewiston	88	35	54.5	1.28
Soda Springs †	780	5	39.6	1.84
Illinois.				
Aurora (1) †	78	23	46.4	.....
Aurora (2)	83	24	46.9	1.11
Beardstown †	.....	.....	.....	4.63
Beason	77	28	47.4	1.70
Belvidere	80	20	44.5	0.50
Centralia	82	27	54.0	1.95
Charleston *	85	26	49.6	2.01
Collinsville	80	33	53.2	1.59
Dwight	83	24	48.9	1.79
Fort Sheridan	78	26	47.0	0.75
Gibson City	82	26	45.8	0.38
Golconda	84	34	56.0	1.58
Grand Tower †	.....	.....	.....	1.45
Greenville	86	29	51.9	2.50
Griggsville	85	31	50.4	4.47
Hennepin	83	22	47.0	2.02
Hilton	88	30	52.2	2.95
Irishtown	.....	.....	.....	1.83
Jordans Grove	88	30	55.5	1.51
Lacon	85	27	49.1	2.25
Lake Forest	76	26	45.6	2.40
Lanark	76	27	44.7	1.02
Louisville	82	29	52.6	1.95
Martinsville	82	32	54.6	3.34
Mascoutah	78	28	.....	2.40
Mattoon *	84	22	50.0	2.00
McLeansborough	85	30	53.1	1.52
Mount Carmel †	.....	.....	.....	2.29
Mount Morris	84	18	45.1	1.20
Olney	81	31	50.6	2.71
Oswego *	80	24	45.5	1.00
Ottawa †	73	29	48.8	1.51
Pana	80	32	53.1	2.75
Peoria (1) †	.....	.....	.....	1.87
Peoria (2)	80	28	50.2	2.28
Philo	82*	20	48.1	3.21
Pontiac	80	26	48.3	1.62
Quincy	88	28	58.1	3.95
Richview	87	28	54.5	1.66
Riley	78	28	45.7	0.40
Rockford	78	21	45.3	0.67
Rock Island Ars'l	83	28	50.4	1.15
Sandwich *	81	29	49.1	1.47
South Evanston *g*	80	27	47.8	1.72
Sycamore *	82	22	44.6	0.85
Warsaw †	.....	.....	.....	0.14
Watseka	82	24	46.4	2.68
Wheaton	78	28	44.3	.....
White Hall	78	34	53.2	3.34
Windsor †	80	28	51.6	2.06
Winnebago	82	26	47.6	0.62
Indiana.				
Angola	77	27	47.4	1.45
Butlerville *	.....	30	49.2	2.91
Cannelton	83	30	56.5	0.55
Columbia City	66	25	45.5	0.99
Columbus	78	31	51.0	2.78
Connersville	79	25	48.8	1.90
Dana * *e*	89	27	51.0	1.30
Delphi	78	23	44.2	1.07

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Indiana—Cont'd.	°	°	°	*Ins.*
De Gonia Springs	79	29	52.6	1.84
Evansville †	.....	.....	.....	2.16
Farmland	80	26	48.9	0.95
Franklin	79	29	50.0	2.42
Huntingburgh	81	25	53.8	2.85
Huntington †	.....	.....	.....	1.02
Jeffersonville	80	30	53.9	1.77
La Fayette	80	24	47.9	1.31
Logansport †	.....	.....	.....	1.00
Marengo	86	33	55.2	2.50
Marion	70	25	44.8	0.60
Mauzy	74	20	43.4	1.60
Mount Vernon (1) †	.....	.....	.....	2.17
Mount Vernon (2)	80	32	52.0	2.17
Point Isabel *	.....	25	43.9	0.92
Princeton	81	30	51.3	3.00
Richmond	78	17	47.8	1.83
Rockville	80	26	52.0	3.30
Rushville †	.....	.....	.....	1.55
Scalesville	85	32	55.0	1.55
Seymour	78	27	51.0	2.29
Shelbyville	80	31	51.3	2.92
Spiceland	79	25	49.0	2.14
Sunman †	75	22	47.9	2.27
Vevay	80	28	51.6	2.55
Vincennes †	.....	.....	.....	2.71
Worthington	76	30	50.5	2.62
Indian Territory.				
Cantonment	.....	.....	.....	2.32
Eufaula †	.....	.....	.....	0.93
Fort Gibson	86	30	61.3	1.74
Fort Reno	92	29	61.2	1.88
Fort Sill	94	35	62.2	2.61
Fort Supply	97	29	58.6	4.99
Lehigh * †	85	31	58.0	2.01
Tulsa †	.....	.....	.....	2.05
Iowa.				
Amana †	80	22	46.6	1.12
Ames *	84	20	46.9	0.40
Bancroft	83	17	45.6	0.17
Belle Plaine *	82	28	45.6	0.74
Benton *	82	28	47.3	0.74
Blakeville *	87	26	43.6	T.
Carroll *	.....	26	44.2	0.21
Carson *	83	26	50.8	0.25
Cedar Rapids †	81	24	46.8	1.49
Clarinda *	82	31	49.8	0.70
Clinton	82	24	46.1	1.36
Cresco	81	22	43.0	0.13
Eagle Grove *	84	18	47.5	0.00
Elkader *	74	18	43.0	T.
Fayette †	80	16	43.8	0.38
Fort Madison *	76	28	.....	1.94
Gillett * †	.....	20	40.4	T.
Glenwood (1) *	84	20	44.6	0.18
Glenwood (2)	94	24	55.3	0.55
Grinnell	79	28	44.0	0.60
Hampton	82	16	43.3	0.13
Humboldt *	82	15	45.6	0.15
Independence *	73	29	46.0	T.
Iowa City	73	31	47.8	0.79
Le Claire †	.....	.....	.....	0.75
Logan †	82	20	52.3	0.46
Manson *	76	27	45.9	0.27
Maquoketa *	81	20	44.2	0.85
McCausland *	85	24	48.3	0.99
Monticello *	79	20	44.7	1.25
Mount Pleasant * †	76	32	47.0	1.70
Mount Vernon *	82	29	49.1	1.40
Muscatine (1) †	.....	.....	.....	0.78
Osage	.....	.....	.....	0.02
Oskaloosa (1) *	78	28	48.7	0.62
Sac City †	82	22	44.9	0.45
Storm Lake *	76	20	45.7	0.36
Vinton *	80	19	45.2	0.32
Washington	82	28	50.1	1.13
Webster City *	86	20	44.9	0.18
Wesley †	82	12	43.6	0.10
West Bend * †	78	21	42.7	0.31
Kansas.				
Abilene *	91	30	.....	2.34
Allison *	90	24	50.1	2.00
Arlington	.....	.....	.....	4.60
Atwood †	.....	.....	.....	1.10
Bendena *	.....	35	50.1	1.31
Bucklin	.....	.....	.....	3.25
Buffalo Park *	87	33	.....	.....
Bunker Hill *	92	32	56.8	3.30
Burr Oak *	86	24	.....	.....
Carneiro *	91	30	.....	2.90
Cawker City *	84	27	55.2	2.60
Collyer *	92	35	55.0	3.12
Concordia *	86	26	52.6	1.70
Conway *	90	30	53.2	2.95
Cunningham *	95	28	54.9	3.26
Dorrance *	99	27	.....	6.75
Dwight	.....	.....	.....	1.60
Elco *	89	28	54.8	1.55
Elk Falls †	.....	.....	.....	1.82
Ellis (1)	89	29	.....	1.62
Ellis (2) *	82	38	58.3	.....
Ellsworth	85	40	62.3	3.30
Emporia *	85	31	54.8	0.94
Englewood *	97	32	58.0	3.96
Fort Hays	90	29	55.2	2.17

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Kansas—Cont'd.	°	°	°	*Ins.*
Ft. Leavenworth (1)	86	25	54.2	1.48
Ft. Leavenworth (2)	85	28	52.3	1.11
Fort Riley	89	33	54.8	2.13
Fremont	90	20	54.0	0.77
Globe *	85	29	53.3	1.04
Grainfield *	86	35	57.0	1.70
Grenola *	90	38	58.7	2.00
Grinnell *	90	39	.....	2.30
Halstead	88	32	55.3	1.99
Havensville *	92	31	52.7	2.75
Hays City *	80	40	.....	2.57
Horton *	94	32	52.6	2.23
Independence *	86	32	57.4	2.20
Junction City	.....	.....	.....	1.93
Kanopolis *	92	39	.....	2.70
Kellogg *	90	34	58.0	2.15
Kirwin †	.....	.....	.....	0.40
La Harpe *	.....	39	54.2	2.53
Lakin *	98	32	61.6	3.98
Lawrence	85	29	53.6	2.89
Lebo	93	28	56.0	1.35
Lincoln *	85	28	55.5	.....
Lisbon *	90	30	56.4	2.00
Macksville *	98	33	48.8	3.80
Manhattan (1) †	.....	.....	.....	2.18
Manhattan (2)	96	26	52.2	1.42
Manhattan (3) *	91	28	53.0	1.40
Mankato * †	84	29	51.9	0.02
Marmaton *	86	28	55.6	2.46
McAllaster *	90	28	50.2	0.80
McPherson	.....	.....	.....	2.55
Monument *	88	28	.....	1.55
Morse *	80	28	51.1	0.50
Oakley *	88	36	.....	.....
Oberlin †	.....	.....	.....	0.47
Offerle *	95	33	55.5	5.77
Ogallah *	88	30	.....	2.25
Quinter *	90	30	.....	1.12
Richfield *	98	35	62.4	4.46
Rome *	90	33	58.0	1.19
Russell *	86	32	58.4	3.30
Salina †	.....	.....	.....	2.00
Sedan *	90	34	57.6	2.37
Seneca *	93	27	52.7	1.51
Sharon Springs *	88	29	.....	0.91
Tribune †	90	28	53.6	2.37
Ulysses	.....	.....	.....	3.72
Victoria *	86	29	.....	2.05
Wakefield	.....	.....	.....	3.43
Wa Keeney *	92	38	.....	.....
Walker *	90	30	.....	.....
Wallace †	.....	.....	.....	1.26
Weskan *	90	30	53.2	?
Wilson *	88	29	.....	2.86
Winona *	88	30	.....	2.00
Yates Center	86	27	54.8	1.77
Kentucky.				
Ashland * †	.....	23	45.2	4.25
Bowling Green †	85	30	57.7	1.62
Burnside †	.....	.....	.....	2.10
Canton *	82	28	53.5	1.15
Catlettsburgh †	.....	.....	.....	3.19
Earlington	84	27	54.6	0.84
Eddyville †	.....	.....	.....	1.69
Falmouth (1) †	.....	.....	.....	3.31
Falmouth (2) †	74	27	47.9	3.32
Frankfort (1) †	.....	.....	.....	1.29
Frankfort (2)	84	27	50.7	1.65
Franklin † *	89	27	56.5	1.81
Greensburgh †	.....	.....	.....	3.14
Louisa †	.....	.....	.....	2.72
Millersburgh * †	76	30	53.2	1.50
Mount Sterling †	76	28	48.5	3.65
Murray	86	27	54.8	2.68
Newport Barracks	80	25	50.0	2.71
Owenton † d	77	24	51.4	1.50
Paducah †	.....	.....	.....	0.72
Pellville †	.....	.....	.....	1.55
Richmond †	79	26	52.5	4.05
Shelbyville †	82	29	51.4	2.42
South Fork † *	79	30	51.6	5.10
Williamsburgh †	.....	.....	.....	2.50
Louisiana.				
Abbeville *	83	46	69.7	0.02
Alexandria †	93	37	67.8	0.17
Amite City †	90	35	65.9	0.32
Cameron †	100	38	70.0	0.15
Cheneyville (2) †	92	32	66.6	0.08
Clinton	86	39	65.5	T.
Columbia A.	85	35	64.4	0.23
Convent	91	39	67.4	0.07
Coushatta (1)	.....	.....	.....	0.47
Coushatta (2) †	88	35	63.2	0.57
Crowley	85	36	64.2	0.00
Delhi †	.....	.....	.....	1.50
Donaldsonville	87	39	65.0	0.15
Edgard	94	45	69.5	0.06
Emilie	86	41	66.6	T.
Farmerville	89	35	63.6	0.75
Girard †	.....	.....	.....	0.40
Grand Cane	90	34	67.0	0.80
Grand Coteau	86	40	67.6	T.
Hammond	87	38	65.5	0.00
Houma †	87	41	65.9	0.28
Jeanerette	88	37	67.1	T.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Louisiana—Cont'd.	°	°	°	*Ins.*
La Fayette (2) †	87	38	67.4	0.00
Lake Charles	88	44	68.3	0.10
Liberty Hill	95	32	66.0	0.46
Luling	87	37	63.7	0.34
Mandeville	88	41	66.6	0.00
Marksville * †	90*	40	66.3	0.15
Maurepas	86	39	64.8	0.00
Melville †	87	40	66.8	0.46
Minden †	89	36	66.2	0.07
Monroe †	84	36	63.8	0.44
Natchitoches †	88	38	63.2	0.55
New Iberia	95	39	71.3	0.00
Plaquemine	89	31	65.0	0.39
Pointe à la Hache * †	.....	52	69.8	T.
Port Eads	88	53	72.4	0.02
Shell Beach	85	54	69.2	0.00
Sugar Ex. station	90	42	66.6	0.00
Thibodeaux	.....	.....	.....	0.17
Trinity	89	39	63.8	0.60
Vidalia	96	37	67.7	0.18
Winnfield † *	86	39	65.5	0.44
Maine.				
Bar Harbor	64	30	47.6	5.86
Belfast *	61	30	45.7	.....
Calais	65	21	45.0	4.72
Cornish	66	17	43.8	4.41
Fairfield	65	14	42.3	3.57
Farmington *k*	.....	22	37.3	1.59
Fort Preble	.....	.....	.....	3.85
Kennebec Arsenal	62	19	43.2	2.92
Kent's Hill	66	23	44.4	5.74
Lewiston	66	18	43.3	4.61
Mayfield *	58	13	39.2	5.83
Orono †	64	17	43.6	4.04
Petit Menan *	61	39	45.6	.....
Maryland.				
Barren Creek Sp'gs †	85	35	54.8	5.56
Cumberland (1)	78	24	49.5	2.84
Cumberland (2)	80	28	53.6	2.31
Fallston	80	31	49.6	5.02
Fort McHenry	75	32	53.3	3.31
Frederick	79	31	55.8	4.51
Gaithersburgh *	.....	30	47.1	.....
Galena † *	.....	36	52.7	4.75
Gambrills *	.....	32	52.0	2.81
Jewell	.....	37	53.6	6.25
McDonogh	76	31	50.9	4.93
Mt. St. Mary's Col †	76	24	50.2	3.38
Woodstock	76	30	50.8	3.81
Massachusetts.				
Amherst	69	23	43.2	4.14
Amherst Ex Sta (1)	70	21	45.2	4.10
Amherst Ex Sta (2)	70	21	46.5	4.58
Blue Hill (sum't)	71	28	45.7	5.20
Blue Hill (base)	72	26	47.3	5.15
Blue Hill (valley)	74	25	47.1	4.98
Boston	.....	.....	.....	4.19
Brewster	68	36	50.2	5.43
Cambridge (1)	70	27	47.8	3.65
Cambridge (2)	72	27	46.8	3.73
Chestnut Hill	75	27	47.8	3.83
Clinton	.....	.....	.....	3.55
Cotuit	68	32	49.9	5.58
Deerfield *	70	18	46.0	.....
Dudley	73	28	45.6	4.20
Fall River (1)	70	32	48.8	5.51
Fall River (2)	71	30	49.8	5.39
Fiskdale	.....	.....	.....	5.40
Fitchburg (1) *	70	27	44.5	5.08
Fitchburg (2)	71	25	46.1	5.77
Fort Warren	70	32	47.3	2.94
Framingham	72	26	47.6	4.65
Gilbertville	67	16	45.7	5.35
Groton	71	23	47.0	4.79
Heath	70	20	46.5	.....
Holyoke	74	27	48.0	4.20
Lake Cochituate	75	18	46.5	3.85
Lawrence	70	27	46.8	4.21
Leicester	67	26	44.5	4.26
Leominster	.....	.....	.....	5.39
Long Plain *	70	30	48.8	6.10
Lowell (1)	69	26	46.5	4.26
Lowell (2)	73	24	46.4	.....
Lowell (3)	70	29	47.8	.....
Ludlow	69	20	45.0	5.08
Lynn	66	29	46.6	5.03
Mansfield	69	26	46.7	5.62
Medford	.....	.....	.....	4.31
Middleborough	71	24	48.2	4.68
Milton *	68	27	47.1	4.66
Monson	70	16	46.6	6.21
Mount Nonotuck	.....	.....	.....	3.05
Mystic Lake	.....	.....	.....	3.71
Mystic Station	.....	.....	.....	3.88
Nahant *g*	66	34	45.8	.....
New Bedford (1)	67	30	48.6	3.96
New Bedford (2)	68	32	49.6	3.88
Newburyport (1)	73	30	46.9	4.71
Newburyport (2)	.....	.....	.....	4.92
Northampton	68	24	47.1	4.15
North Billerica	72	25	46.6	3.38
Plymouth *	71	37	51.9	3.29
Princeton	67	25	45.1	4.85
Provincetown	67	34	50.3	4.95
Randolph	.....	.....	.....	5.47

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Massachusetts—Con.	°	°	°	*Ins.*
Royalston*	70	30	47.9	5.25
Salem (1)*	71	33	48.7	.....
Salem (2)	.....	.....	.....	3.84
Somerset*	74	26	50.9	4.40
Springfield Armr'y.	70	25	47.6	4.67
Swampscott	68	31	.....	.....
Taunton (1)	74	27	49.2	4.75
Taunton (2)	70	25	48.2	4.39
Taunton (3)	71	25	48.3	4.44
Waltham	.....	.....	.....	3.62
Wellesley	71	25	48.0	4.03
Westborough*	71	24	48.8	4.12
Williamstown	67	18	43.7	2.95
Winchester	.....	.....	.....	3.47
Worcester (1)*	70	27	45.5	3.54
Mexico.				
Leon de Aldemas	79	43	62.5	0.15
Masatlang	87	75	81.1	0.04
Mexico	73	43	59.0	0.37
Puebla	77*	43	61.5	.....
Topo Chico*	88	65	76.6	0.05
Topolobampo	85	69	78.4	0.72
Michigan.				
Adamsville	.....	.....	.....	1.15
Adrian	80	18	45.4	1.27
Albion (1)	73	26	44.9	1.37
Allegan	.....	.....	.....	1.67
Alma	75	15	42.4	1.26
Ann Arbor	74	26	45.0	0.80
Arbela	.....	.....	.....	1.04
Atlantic*	.....	.....	33.2	0.33
Ball Mountain	.....	.....	.....	0.56
Bear Lake	58	15	39.0	0.58
Bell Branch*	64	23	44.2	1.11
Benton Harbor	76	27	49.0	1.32
Berlin*	73	22	45.6	1.07
Berrien Springs*	74	27	44.7	2.35
Big Rapids	71	16	42.2	0.65
Birmingham	72	20	44.4	1.20
Bronson	.....	.....	39.0	1.46
Buchanan	72	29	46.1	1.68
Calumet	62	22	36.7	0.37
Cassopolis	73	28	44.3	1.17
Cauldwell	66	15	40.6	0.56
Charlevoix	62	21	42.7	0.43
Chase	72	18	41.2	0.50
Chelsea	76	21	45.9	0.83
Clinton	.....	.....	.....	0.98
Colonf	.....	.....	40.2	1.32
Columbiaville	70	25	44.9	0.97
Concord	77	23	45.2	1.30
Crawford	.....	.....	.....	0.57
Deer Lake	62	16	40.3	0.35
East Tawas	64	24	42.6	1.27
Evart	73	22	36.4	0.32
Fitchburg	.....	.....	.....	0.55
Flint	72	17	43.5	1.16
Fort Brady	58	20	38.9	1.74
Fort Mackinac	61	25	41.1	1.29
Fort Wayne	77	17	45.9	0.57
Fremont*	65	22	41.6	0.49
Gladwin	75	14	41.6	0.40
Grand Rapids	71	25	43.5	0.48
Grape	.....	.....	.....	0.87
Grayling	64	10	37.6	0.70
Gulliver Lake	58	18	39.7	0.39
Hanover	73	24	46.4	0.99
Harrisville	62	14	40.2	1.61
Hart	65	15	45.0	0.70
Hastings	73	22	43.7	0.97
Hillman g	68	10	41.9	1.22
Hillsdale	76	23	46.5	1.21
Highland Station*	60	26	43.2	0.73
Hudson	76	16	43.0	1.49
Ivan	63	16	37.9	0.98
Jeddo	66	25	44.6	1.44
Kalamazoo	74	26	46.8	1.41
Lansing	73	19	43.8	0.75
Lathrop	64	16	39.2	0.83
Madison	79	21	42.5	1.09
Manchester	.....	.....	.....	0.78
Marshall	76	21	43.8	1.44
May	68	23	45.2	1.54
Mio	60	11	38.4	1.00
Montague	65	19	45.3	0.45
Mottville	79	19	46.2	1.51
Noble	.....	.....	.....	1.25
North Adams	76	21	45.1	0.93
North Aurelia	.....	.....	.....	0.20
North Marshall	75	20	42.8	1.13
Olivet	73	20	43.2	1.06
Otsego	73	20	41.5	.....
Ovid	70	19	43.4	0.73
Paw Paw	75	20	46.5	1.60
Pontiac	68	27	46.0	1.21
Pulaski*	60	27	42.4	0.99
Rawsonville*	73	22	46.9	0.80
Romeo	72	23	45.9	0.61
Roscommon	64	8	35.5	0.74
Saint Ignace	58	19	39.6	1.43
Saint John's	71	21	42.0	0.64
Sand Beach	65	27	43.8	0.97
Standish	67	14	42.7	0.42
Stanton	71	21	43.1	0.75
Stockbridge	.....	.....	.....	0.63

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Michigan—Cont'd.	°	°	°	*Ins.*
Traverse City (1)	64	16	43.0	0.60
Traverse City (2)	59	20	41.7	0.71
Thornville	69	20	45.6	1.28
Vandalia s	.....	.....	42.5	1.27
Vienna	.....	.....	.....	1.12
Washington	71	18	45.0	0.83
Weldon Creek	.....	.....	.....	0.22
West Branch	64	23	40.8	0.93
Williamstown	74	22	46.7	1.30
Ypsilanti (1)	75	16	43.2	0.88
Ypsilanti (2)	77	24	46.1	0.55
Minnesota.				
Alexandria†	.....	.....	.....	0.14
Brainard	78	19	44.6	0.28
Crookston †	70	18	40.2	0.03
Farmington	76	24	44.6	0.01
Fergus Falls†	.....	.....	.....	0.00
Fort Ripley †	.....	.....	.....	0.16
Fort Snelling	78	20	46.4	0.00
Grand Meadow*	75	20	42.2	0.17
L. Winnibigoshish	70	23	40.0	0.25
Leech Lake	73	18	38.6	0.34
Le Sueur*	77	25	43.2	0.12
Mankato	78	21	45.8	0.02
Minneapolis (1)*	75	25	43.8	0.06
Montevideo* †	80	21	40.1	0.00
Morris	76	22	43.6	T.
Northfield	77	18	43.3	0.04
Ortonville †	.....	.....	.....	0.00
Osseo*	73	20	40.5	0.20
Owatonna	80	17	42.7	0.03
Pine River	66	10	36.2	T.
Pokegama Falls	74	11	37.9	0.31
Red Wing	76	22	43.1	0.02
Redwood Falls†	.....	.....	.....	0.07
Rolling Green	78	21	44.1	T.
Saint Charles *†	82	20	47.2	T.
Sheldon*	.....	22	41.8	.....
Tracy †	.....	.....	.....	0.04
Mississippi.				
Aberdeen †	84	28	58.5	0.20
Agricultural Col'ge	86	34	62.2	0.70
Batesville †	82	30	60.0	0.00
Brookhaven†	90	34	65.7	0.02
Canton*	.....	37	.....	0.28
Columbus†	90	31	62.4	0.58
Corinth †	82	28	56.8	0.38
Edwards†	88	40	64.6	0.45
Fayette	90	39	66.2	0.17
Greenville	84	36	62.3	0.40
Hazlehurst †	92	36	65.4	0.00
Hernando †	88	30	60.2	0.02
Holly Springs (1)*	78	40	61.8	0.46
Holly Springs (2) †	82	36	60.7	0.60
Jackson f	88	36	64.0	0.27
Kosciusko †	89	33	63.7	0.06
Lake †	88	30	61.8	0.02
Loch Leven	88	38	65.1	0.61
Logtown	88	.....	68.0	0.06
Louisville †	93	30	63.8	0.17
Macon (2) †	88	34	66.3	0.08
Natchez †	92	34	64.8	0.18
Okalona †	86	32	61.8	0.10
Pearlington †	88	41	67.4	0.06
Port Gibson †	92	32	63.6	0.11
Pontotoc †	83	33	58.2	0.19
Rienzi *	85	38	58.2	0.48
Ripley *†	.....	33	53.6	0.65
Summit †	86	36	63.6	0.04
Water Valley *	86	34	61.9	0.39
Waynesboro' (1) †	88	35	62.0	0.00
Waynesboro' (2) †	88	34	62.7	0.00
Yazoo City †	.....	.....	.....	0.00
Missouri.				
Boonville†	.....	.....	.....	1.63
Brunswick*	80	32	54.2	3.60
Carthage †	.....	.....	.....	3.00
Conception	84	27	51.5	0.85
Excelsior Springs*	83	22	50.9	2.81
Fayette †	86	28	51.7	3.36
Frankford (1)*	83	24	46.0	5.61
Glasgow	85	29	52.1	3.97
Grand Pass	84	34*	52.7	3.05
Harrisonville†	92	28	51.9	0.73
Hermann †	.....	.....	.....	1.59
Ironton *	84	30	54.5	2.05
Jefferson Barracks	92	28	56.4	2.60
Kansas City	88	28	54.7	1.47
Kidder	.....	.....	.....	3.10
Lamont*	88	40	62.2	1.76
Louisiana Bridge †	.....	.....	.....	2.52
New Frankfort*	86	32	55.0	3.15
New Haven *	88	40	59.7	2.88
Ozark *	87	27	55.6	1.60
Princeton*	84	31	54.0	1.05
Saint Charles (1)	.....	.....	.....	1.30
Saint Charles (2)	83	32	54.1	2.19
Saint Joseph†	.....	.....	.....	1.20
Sedalia	88	30	56.0	2.99
Shelbina	.....	.....	.....	5.60
Springfield	84	32	56.7	2.25
Steelville	84	23	47.7	2.75
Warrensburgh*	86	32	52.0	2.53
Warrenton*	.....	36	51.0	.....
Willow Springs †	92	29	57.2	2.87

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Missouri—Cont'd.	°	°	°	*Ins.*
Wither's Mill*	80	32	.....	6.03
Montana.				
Camp Poplar River	93	11	47.0	0.02
Custer †	.....	.....	.....	0.06
Fort Assiniboine	88	18	50.6	0.00
Fort Custer	89	23	50.8	0.50
Fort Keogh	92	18	51.1	0.67
Fort Logan †	80	16	43.9	0.37
Fort Maginnis	94	20	51.4	0.05
Fort Missoula	81	25	48.5	1.27
Fort Shaw	91	20	51.2	0.00
Galpin †	.....	.....	.....	0.16
Glendive †	91	18	51.6	0.03
Kintyre	.....	.....	.....	0.12
Powder River †	96*	15	49.4	0.37
Sheldon *	80	28	47.4	0.90
Virginia City	83	19	45.0	0.48
Nebraska.				
Alliance †	91	25	53.0	1.15
Ansley †	86	11	49.3	0.60
Ashland	84	23	51.3	0.15
Craig	82	22	50.3	0.20
Creighton †	80	15	45.2	0.19
Crete	83	22	50.7	0.37
Culbertson (1) †	.....	.....	.....	1.30
David City †	82	18	42.0	1.50
De Soto *	83	24	50.1	0.74
Fairbury	.....	32	.....	1.07
Falls City†	89	28	53.8	2.14
Fort Niobrara	91	24	51.6	1.37
Fort Omaha	84	27	50.4	0.83
Fort Robinson	87	24	51.9	0.74
Fort Sidney	90	12	48.4	1.00
Fremont*	78	23	50.5	0.45
Genoa †	83	20	50.1	0.58
Gering †	84	24	51.3	1.80
Grand Island	.....	18	45.0	0.46
Hay Springs	84	22	46.9	0.60
Howe	90	27	54.1	0.68
Kennedy † *	84	29	49.9	1.70
Lexington k	72	19	42.3	0.37
Minden	.....	20	49.4	1.85
Nebraska City	82	24	49.7	0.95
North Loup †	88*	15	50.0	0.45
Palmer	80	20	45.6	0.50
Plattsmouth †	.....	.....	.....	0.69
Ravenna	84	16	51.4	1.04
Saronville	80	20	51.3	0.50
Syracuse *	84	26	51.9	1.41
Tecumseh †	81	35	54.0	1.85
Weeping Water*	83	21	49.0	T.
West Hill	83	25	51.3	0.46
Weston	82	31	51.8	0.62
West Point	85	.....	.....	0.02
Nevada.				
Battle Mountain*	80	30	51.3	1.55
Beowawe (1)*	89	28	52.6	0.96
Brown's *	90	29	55.2	0.42
Carlin*	87	25	48.6	1.60
Fenelon*	98	27	53.7	1.14
Golconda *	92	30	56.2	0.18
Halleck *	82	26	50.2	1.15
Hawthorne (1)*	76	36	54.9	0.60
Humboldt (1)*	80	28	50.9	0.57
Palisade	86	25	52.4	2.41
Reno *	78	28	51.5	0.75
Tecoma*	84	35	52.3	1.00
Toano *	82	28	51.1	1.15
Wadsworth*	85	28	54.5	0.29
Wells *	78	22	49.8	0.13
Winnemucca *	79	30	47.5	0.49
New Hampshire.				
Antrim	.....	.....	.....	5.35
Belmont	.....	.....	.....	4.51
Berlin Falls	65	6	38.4	.....
Berlin Mills	66	19	45.9	3.00
Bristol	.....	.....	.....	4.37
Concord	71	17	45.2	4.21
Hanover (1)	64	15	42.4	4.60
Hanover (2)	68	13	42.4	4.70
Lake Village	.....	.....	.....	4.77
Manchester (1)	71	21	45.5	4.03
Manchester (2)	65	22	46.0	4.27
Mine Falls	.....	.....	.....	5.15
Nashua *	73	20	46.0	4.64
Newton	60	23	44.8	3.68
North Chesterfield	64	11	38.2	5.51
North Conway	63	16	42.6	4.97
North Sutton *	65	17	41.9	3.94
Pennichuck Sta	.....	.....	.....	4.33
Plymouth	66	11	41.4	4.14
Shaker Village	63	21	42.7	4.09
Stratford	67	12	43.8	2.96
Walpole	62	15	41.6	4.77
West Milan	67	8	40.5	3.35
Weir's Bridge	.....	.....	.....	3.87
Wolfborough	.....	.....	.....	3.81
New Jersey.				
Allaire	74	29	50.8	.....
Asbury Park	70	34	51.9	4.27
Belleville	.....	.....	.....	3.15
Beverly †	82	32	49.9	4.32
Billingsport L. H*	78	35	52.5	.....
Bridgeton*	78	37	53.6	3.91
Cape May C. H.	75	36	52.6	.....

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
New Jersey—Cont'd.	°	°	°	*Ins.*
Egg Harbor City	80	32	50.2	4.78
Freehold	75	30	49.8	3.43
Gillette	72	25	49.7	3.31
Hanover	68	23	45.1	3.15
Highland Park	73	31	49.6	3.57
Hopewell	.....	.....	.....	5.03
Imlaystown*	78	32	51.3	3.49
Jersey City	73	33	50.8	.....
Lambertville *	75	33	50.8	4.82
Locktown	76	31	49.8	4.63
Madison	74	27	48.6	3.07
Moorestown *	79	32	49.8	4.03
Newark	71	32	50.4	2.42
New Brunswick (1)	72	33	.....	3.13
New Brunswick (2)	72	31	50.8	3.32
New Brunswick (3)	71	30	50.8	.....
Ocean City*	73	35	53.1	4.39
Oceanic	75	39	52.4	4.28
Plainfield	76	29	50.1	4.11
Princeton	72	31	50.1	3.38
Rancocas	75	32	.....	3.87
Readington *	72	36	55.8	.....
South Orange	72	31	48.4	3.46
Tenafly	75	29	48.3	4.72
Toms River	74	30	50.3	5.03
Trenton *	75	33	53.0	4.66
Union *	72	32	48.7	3.15
Valley	.....	.....	.....	1.18
Woodbury	81	34	52.5	4.46
New Mexico.				
Albuquerque †	85	29	63.8	0.76
Chama	.....	.....	.....	1.04
Coolidge	83	17	49.0	0.20
Deming *	86	40	65.1	0.84
Eddy	.....	.....	.....	1.59
Fort Bayard	85	30	57.7	0.67
Fort Marcy	82	25	51.3	0.32
Fort Selden	93	29	62.0	1.06
Fort Stanton	82	22	53.3	1.55
Fort Union	76	20	45.5	0.45
Fort Wingate	.....	.....	.....	0.41
Gallinas Springs †	84	35	60.1	1.85
Hillsborough †	81	32	58.1	0.78
Las Vegas †	85	30*	44.9	1.30
Lordsburg *	85	45	62.4	0.41
Las Lunas †	94	42	59.8	0.35
Nogal	.....	.....	.....	2.38
Red Cañon	.....	.....	.....	1.60
Roswell k	70	31	51.6	2.55
Springer †	.....	.....	.....	0.70
New York.				
Adelphia Academy (Brooklyn)	71	35	51.6	1.76
Alfred Centre	62	19	39.7	2.44
Angelica †	62*	12	39.6	3.33
Ardenia *	69	29	47.8	4.50
Auburn	68	23	43.5	3.38
Boyd's Corners *	73	30	48.6	5.09
Canton †	65*	16	38.8	3.52
Cen'l Park, N. Y. C'y	73	32	49.7	2.61
Cooperstown *	65	19	41.6	2.17
Davids Island	71	34	50.1	4.82
Eden*	59	36	45.0	2.70
Elmira †	67	19	45.5	3.51
Factoryville †	68	16	42.9	4.04
Fleming *	72	26	42.6	.....
Fort Columbus	72	36	52.0	2.43
Fort Hamilton	73	35	52.0	2.12
Fort Niagara	70	25	46.9	2.89
Fort Porter	64	24	43.0	4.02
Fort Schuyler	70	26	50.8	2.88
Fort Wadsworth	75	33	51.4	3.01
Geneva	71	18	43.7	3.34
Hess Road Sta †	66	19	42.7	8.32
Honeymead Brook*	71	18	45.3	3.68
Humphrey †	81	25	44.1	2.40
Ilion †	72	18	43.5	3.30
Ithaca	68	18	43.1	3.62
Lyons	68	22	43.6	3.58
Madison Barracks	69	14	41.4	3.08
Middleburgh †	75	17	44.1	2.40
Nineveh *	92	16	45.7	3.95
North Hammond † *	67	16	41.6	3.49
Number Four †	60	15	37.0	4.30
Palermo †	67	20	41.8	3.28
Palmyra *	65	18	43.8	.....
Pendleton Centre *	60	28	40.4	.....
Perry City	69	13	40.6	3.83
Plattsburgh B'ks	62	18	42.9	3.34
Potsdam *	64	20	40.1	4.42
Rome	65	20	42.2	3.12
Saranac Lake †	60	12	38.1	4.17
Savona †	68	14	41.4	3.00
Schenectady	75	23	47.4	0.97
Setauket	70	37	51.5	4.64
South Canisteo *	65	18	41.9	4.59
South Kortright *†	.....	19	40.3	3.31
Tannersville †	66	16	41.6A	4.49
Turin *	.....	20	39.0	3.82
Utica	69	18	43.7	2.71
Watervleit Arsenal	65	19	45.2	3.20
Wedgewood *	66	24	43.1	3.31
West Point	72	24	47.4	4.85
White Plains *	70	34	49.4	3.03
Willet's Point	73	35	51.2	2.82

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
North Carolina.	°	°	°	*Ins.*
Asheville (1)	.....	.....	.....	0.46
Asheville (2)	78	27	52.3	0.49
Chapel Hill	86	34	56.0	3.32
Charleston	.....	.....	.....	0.82
Clarkton*	87	30	58.1	1.70
Clear Creek*	78	34	58.8	2.70
Franklin*	70	20?	51.2?	0.45
Goldsborough†	83	36	60.5	2.80
Hot Springs	77	26	55.8	.....
Lenoir*	77	30	54.0	0.70
Lumberton†	84	32	58.4	1.34
Mount Holly†	.....	.....	.....	2.75
Mount Pleasant	82	29	55.1	3.15
Monroe	82	34	57.5	2.69
Murphy	.....	.....	.....	2.16
New Berne†	82	32	59.2	3.16
Pittsborough*	79	34	55.1	3.10
Raleigh	85	36	59.0	2.40
Salisbury	78	36	58.2	2.18
Smithfield	79	42	58.8	2.00
Soapstone Mount*	.....	34	52.6	3.00
Southern Pines†	82	42	64.0	4.00
Wadesborough†	84	34	57.7	1.20
Weldon†	81	32	54.6	3.39
Winslow*	82	33	57.4	1.95
Ohio.				
Akron	73	26	46.7	1.42
Ashland*	74	24	46.5	0.89
Athens	77	24	47.8	2.42
Bangorville	73	24	46.2	1.18
Bellevue*	76	26	46.6	0.84
Bement*	75	28	47.7	1.44
Caledonia†	.....	.....	.....	0.71
Canton†	.....	.....	.....	2.04
Carrollton	.....	29	45.0	2.10
Celina	77	27	48.9	0.52
Circleville (1)†	.....	.....	.....	2.30
Circleville (2)	.....	.....	.....	2.51
Clarksville	79	24	47.9	2.21
Cleveland	72	29	48.2	1.91
College Hill	72	31	53.8	3.29
Columbus Barracks	80	24	50.0	1.79
Dayton	79	23	48.3	1.51
Demos	72	25	48.2	2.05
Elyria	77	25	48.8	1.72
Findlay	78	20	46.4	0.92
Fostoria	80	23	48.4	0.85
Garrettsville	73	16	43.6	1.67
Georgetown	82	26	49.8	3.34
Granville	76	27	47.5	2.23
Gratiot*	75	27	48.0	1.41
Greenville	72	25	46.6	1.24
Hanging Rock	81	28	48.5	3.71
Hiram	72	23	45.0	1.52
Hudson	.....	.....	.....	2.18
Jacksonborough	70	28	48.0	2.05
Jefferson	67	24	44.1	2.71
Kent	75	25	49.2	1.95
Kenton*†	80	26	46.5	0.96
Leipsic*	80	28	52.6	.....
Logan	79	23	48.3	2.02
Lordstown	72	16	45.1	1.98
Mansfield†	.....	.....	.....	1.04
Marietta(1)	.....	.....	.....	1.83
Marietta(3)	76	26	49.1	1.77
McConnelsville	79	22	49.1	2.09
Napoleon†	78	22	47.8	0.98
New Alexandria	74	25	49.2	1.15
New Athens*†	75	27	46.8	2.50
New Comerstown	71	20	45.8	1.58
North Lewisburgh	83	25	48.6	0.80
Oberlin	74	24	46.6	1.16
O. S. University	79	23	47.1	1.77
Orangeville*	.....	16	40.0	2.30
Ottawa	.....	.....	.....	0.67
Poland*	.....	21	45.6	1.74
Pomeroy	79	27	52.5	2.03
Portsmouth (1)†	.....	.....	.....	3.36
Portsmouth (2)	80	28	50.2	3.36
Salineville*	.....	30	47.6	1.10
Shanesville*	75	29	50.0	.....
Shiloh*	66	25	46.5	0.55
Sidney†	.....	.....	.....	1.05
Springborough	.....	.....	.....	2.58
Tiffin	75	28	48.1	1.02
Upper Sandusky	75	23	48.0	0.56
Vienna* m	72	29	45.8	1.54
Wapakoneta	79	23	51.9	0.50
Wauseon	80	17	45.2	0.93
Waverly	82	26	51.9	3.08
Waynesville	.....	.....	.....	2.33
Westerville	75	23	46.6	1.51
West Milton*	85	28	52.0	2.45
Weymouth	.....	.....	.....	1.73
Wooster†	76	22	45.3	1.36
Yellow Springs	76	23	47.8	1.29
Youngstown	75	21	48.1	1.97
Zanesville†	.....	.....	.....	1.66
Oregon.				
Albany†	75	42	54.4	6.50
Ashland*	78	38	53.0	1.97
Bandon*	71	40	55.2	11.80
Beulah†	92	23	52.6	1.11
Cascade Locks	.....	.....	.....	6.52
Creswell	78	32	56.7	5.47
Oregon—Cont'd.				
East Portland	76	36	.....	5.23
Ellensburgh	.....	.....	.....	14.80
Eola	73	38	54.9	5.10
Gardiner	.....	.....	.....	10.23
Grant's Pass†	87	36	54.8	3.71
Grass Valley	64	30	47.2	0.82
Heppner†	79	32	53.5	0.88
Hood River	80	34	56.1	1.92
Jacksonville	80	37	54.6	2.04
Jordan Valley	91	20	51.1	0.80
La Grande	84	32	51.8	2.28
McMinnville†	76	30	53.4	5.21
Mount Angel†	77	32	54.5	5.39
Parkers	.....	.....	.....	4.84
Saint Helens	79	37	56.6	5.58
Siskiyou*	85	36	53.1	0.26
Telocaset	.....	.....	.....	2.04
The Dalles	76	32	53.7	0.90
Tillamook*†	70	34	54.8	11.00
Vernonia	75	34	53.2	.....
Pennsylvania.				
Allegheny Arsenal	78	25	50.8	2.07
Altoona	71	26	51.2	2.38
Annville	82	32	53.6	.....
Aqueduct*	77	23	49.4	2.83
Bethlehem	73	28	51.0	3.29
Blooming Grove*†	73	22	45.0	0.10
Blue Knob*	70	22	43.8	4.70
Brookville†	.....	.....	.....	2.36
Cannonsburgh	74	23	45.0	2.87
Carlisle	78	22	50.1	3.75
Catawissa	70	25	48.0	2.82
Centre Valley	82	30	53.5	3.09
Chambersburgh	78	23	47.9	3.24
Charlesville	.....	.....	47.2	.....
Clarion (1)†	.....	.....	.....	4.47
Clarion (2)	71	19	45.8	2.17
Coatesville	83	29	48.3	4.61
Confluence†	.....	.....	.....	3.33
Corry	68	14	43.0	3.44
Drifton	68	26	45.0	5.74
Doylestown	.....	.....	.....	4.27
Dyberry	70	14	41.6	3.75
Eagle's Mere	66	18	41.7	5.61
Easton	.....	.....	.....	4.51
Edinborough	62	22	43.0	.....
Emporium	69	15	46.3	3.70
F'ks of Neshaminy	.....	.....	49.8	4.77
Franklin*	64	14	43.4	3.10
Frankford Arsenal	81	32	52.0	4.15
Frederick	.....	.....	.....	4.62
Freeport†	.....	.....	.....	2.99
Germantown	68	30	49.3	5.41
Gettysburgh†	.....	.....	.....	4.07
Girardville	70	25	46.5	4.41
Grampian Hills	70	20	45.1	3.21
Greensborough†	.....	.....	.....	2.87
Greenville	74	19	42.2	2.74
Hollidaysburgh	76	17	41.0	2.90
Honesdale	68	18	45.4	4.02
Huntingdon	76	18	46.5	3.67
Indiana	73	21	47.1	3.52
Johnstown	73	21	47.1	2.55
Kennett Square	.....	.....	50.0	5.04
Lancaster	80	27	49.7	3.88
Lansdale	.....	.....	.....	5.02
Le Roy	66	20	42.6	4.73
Lewisburgh	69	20	44.2	3.04
Lock No. 4†	.....	.....	.....	3.27
Mahoning†	.....	.....	.....	1.90
Mauch Chunk†	74	24	46.8	4.98
McConnellsburgh	77	26	48.2	3.14
Meadville (1)†	69	10	38.9	2.07
Meshoppen†	.....	.....	.....	3.08
Myerstown	76	27	47.8	4.47
New Bloomfield	75	20	47.4	4.35
New Castle	73	17	48.0	1.88
Nisbet*	.....	24	45.0	4.20
Oil City†	.....	.....	.....	3.17
Ottsville	.....	.....	.....	5.09
Parker's Landing†	.....	.....	.....	3.28
Petersburgh	76	20	46.3	3.29
Philipsburgh†	75	14	45.0	3.54
Pleasant Mount	.....	.....	42.2	4.50
Point Pleasant	.....	.....	.....	5.06
Pottstown	79	30	51.0	4.56
Quakertown	78	26	47.4	5.23
Reading†	75	28	49.8	5.74
Rimersburgh	71	23	46.0	.....
Salem Corners	70	22	43.3	4.31
Saltsburgh†	.....	.....	.....	2.30
Seisholtzville	.....	.....	.....	5.17
Selin's Grove	69	22	48.9	3.65
Smith's Corners	.....	.....	.....	4.99
Somerset	73	17	44.6	2.61
South Eaton	70	20	45.0	4.11
State College	72	20	46.0	3.36
Swarthmore	79	32	50.1	5.29
Tipton*	75	17	46.6	2.82
Troy*	64	14	42.9	3.15
Tuscarora	76	25	50.3	3.43
Uniontown	75	25	50.1	3.31
Warren†	.....	.....	.....	3.66
Wellsborough*	65	13	41.2	5.56
West Chester	80	28	50.7	4.97

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Pennsylvania—Con.	°	°	°	*Ins.*
Westtown	80	26	50.2	5.37
Wilkes Barre	75	23	49.0	3.16
Wysox	70	16	43.7	3.16
York	80	27	49.9	4.03
Rhode Island.				
Bristol	67	31	50.1	4.99
Fort Adams	76	33	52.2	4.39
Kingston (1)	71	30	48.4	3.02
Kingston (2)	67	28	47.9	5.18
Lonsdale	.....	.....	.....	4.93
Newport	68	34	51.4	.....
Olneyville	80	32	52.2	.....
Pawtucket	.....	.....	.....	5.01
Providence (1)	69	32	49.2	4.52
Providence (2)	74	29	49.1	4.58
Woonsocket	70	27	47.1	5.21
South Carolina.				
Allendale†	86	32	62.8	1.33
Batesburgh†	84	36	61.5	2.91
Belmont	83	33	58.0	0.93
Blackville†	84	34	62.0	2.17
Branchville†	86	34	60.6	0.80
Brewer Mine	88	32	60.0	3.86
Cheraw†	84	32	59.3	3.14
Chester†	88	30	61.6	0.70
Clinton	80	35	57.5	0.59
Columbia Ex. Sta	86	33	59.5	3.70
Conway	84	43	63.5	1.69
Florence†	84	36	60.8	2.46
Greenville†	80	30	57.4	1.08
Greenwood†	84	36	61.2	0.70
Hardeeville†	88	34	62.7	0.99
Jacksonborough†	86	28	60.6	0.27
Kingstree†	84	40	62.8	1.83
Kirkwood*	.....	32	53.2	3.91
Port Royal*†	84	45	66.0	0.10
Saint Georges†	86	34	60.8	0.20
Saint Matthews†	86	34	62.8	0.44
Simpsonville	88	34	62.4	0.59
Spartanburgh (2)†	84	22	58.0	0.18
Statesburgh†	82	36	60.4	2.81
Timmonsville	86	44	65.0	1.77
Trial	83	33	58.0	0.39
Walhalla	77	36	56.5	0.32
Winnsborough	82	30	56.0	1.99
Yorkville	84	32	58.0	2.24
Tennessee.				
Andersonville	80	28	55.5	1.22
Arlington†	82	30	57.0	0.80
Ashwood*†	80	30	56.6	1.09
Austin†	82	28	56.7	1.31
Bolivar (1)	85	45	59.6	T.
Bolivar (2)†	86	32	60.8	0.06
Brownsville†	84	44	63.7	0.90
Carthage†	.....	.....	.....	1.78
Charleston†	.....	.....	.....	2.33
Clarksville	82	32	56.1	1.67
Clinton†	.....	.....	.....	1.35
Cog Hill	82	34	59.0	0.09
Columbia†	.....	.....	.....	0.90
Covington (1)	80	38	58.2	1.15
Covington (2)†	78	34	57.7	0.95
Dunlap	80	33	58.7	1.92
Dyersburgh†	83	30	57.6	0.94
Fayetteville	83	34	58.9	1.38
Florence Station	80	37	56.3	1.38
Grand Junction†	84	34	60.0	0.75
Greeneville	76	27	52.2	1.50
Grief	82	32	58.6	1.52
Hohenwald	85	26	52.2	1.14
Jacksborough	77	27	54.9	1.04
Johnsonville†	.....	.....	.....	0.63
Kingston (1)	.....	.....	.....	1.19
Kingston Springs	82	28	54.5	1.18
Leeville	86	29	59.0	1.42
Lookout Mountain†	81	29	57.3	1.56
Loudon†	.....	.....	.....	1.30
Lynnville	76	32	50.3	1.63
McKenzie	77	38	58.6	0.25
McMinnville	76	29	53.1	1.86
Milan (1)	86	31	56.0	0.81
Milan (2)†	84	30	57.6	0.57
Nunnelly	83	26	53.2	1.15
Parksville	78	32	56.0	1.56
Riddleton	82	26	55.4	1.55
Rockwood†	.....	.....	.....	1.27
Rogersville	73	30	53.4	1.69
Rugby	78	31	51.2	0.91
Savannah	80	30	60.0	0.89
Springdale	82	31	54.8	1.45
Strawberry Plains†	.....	.....	.....	1.70
Trenton	83	30	55.0	1.15
Tullahoma	77	32	57.2	0.23
Watkins	81	31	58.0	0.43
Waynesborough	80	28	53.7	0.66
Texas.				
Austin (1)	89	42	68.6	0.98
Austin (2)*	87	36	69.4	.....
Belton†	94	34	68.9	0.07
Brady†	87	36	64.7	0.50
Brazoria†	86	39	67.2	0.01
Brenham†	88	43	71.5	0.21
Brownwood†	91*	36	65.6	0.19
Camp Eagle Pass	94	44	69.8	1.26
Texas—Cont'd.				
C'p Peña Colorado	86i	35	62.3d	0.93
Childress	.....	.....	.....	2.56
Cleburne	82	32	61.6	0.00
Coldwater†	.....	.....	.....	4.00
College Station	97	43	71.4	0.11
Columbia Station†	86	39	69.8	0.00
Corsicana (2)†	90	38	70.2	0.02
Cuero	90	34	71.0	0.00
Dallas (2)†	92	38	69.7	0.00
Decatur†	88	39	64.9	0.71
Duval*	89	42	70.0	0.65
Edinburgh†	.....	.....	.....	0.05
Epworth†	88	30	68.4	1.89
Forestburgh*	.....	54	67.0	1.62
Fort Bliss	90	39	65.3	0.49
Fort Brown	91	51	85.4	0.20
Fort Clark	90	40	67.7	0.48
Fort Davis	84	50	69.2	0.57
Fort Elliott	95	35	59.5	2.60
Fort Hancock	89	28	60.7	0.62
Fort McIntosh	91	44	70.2	2.10
Fort Ringgold	99	42	74.2	1.89
Fort Worth†	90	38	67.5	1.95
Fredericksburgh†	86	41	65.3	1.61
Gallinas†	94	35	69.0	0.79
Graham†	92	36	63.5	0.85
Hartley	98	24	62.3	4.85
Hearne†	88	34	68.6	0.00
Houston†	86	36	69.3	0.03
Howe*†	88	38	63.0	1.28
Huntsville†	90	37	70.6	0.02
La Grange†	.....	34	70.2	2.17
Lampasas†	91	36	67.0	0.38
Longview†	88	34	66.6	0.60
Luling†	90	40	70.1	1.07
Menardville*†	88	43	64.0	.....
Merkel†*	.....	45	62.3	2.15
Mesquite†	88	36	66.4	1.79
Miami†	.....	.....	.....	0.25
New Braunfels†	88*	40	64.4	0.90
New Ulm	92	43	70.5	0.69
Ochiltree	82	39	57.0	2.58
Panhandle†k	91	35	62.8	1.82
Panter (*Granbury*)	87	48	66.4	1.11
Paris†	88	36	65.6	1.00
Pecos City†*	86	40	63.1	1.05
Round Rock†*	92	32	69.8	0.30
San Antonio	100	34	68.1	0.09
Santa Maria	.....	.....	.....	0.36
Silver Falls†	94	38	63.1	2.98
Snyder†*	.....	44	57.9	2.90
Sugar Land	90	38	73.3	0.30
Tyler†	88	32	65.5	1.50
Waco (2)†	94	36	67.1	0.00
Utah.				
Alta	.....	.....	.....	0.60
Beaver†	88	22	51.4	1.62
Bingham†	.....	.....	.....	2.43
Corinne*	85	32	52.9	3.25
Fort Douglas	89	28	54.0	3.81
Fort DuChesne	85	20	49.0	0.66
Kelton*	86	31	55.7	0.57
Levan	.....	.....	.....	2.48
Loseet	85	20*	48.3	1.10
Moab†	91*	28	54.4	0.80
Mount Carmel†*	86	31	48.2	2.41
Mount Pleasant†	72	27	42.6	1.35
Nephi†	89	25	51.0	1.72
Ogden (1)*	.....	.....	.....	T.
Ogden (2)	80	33	49.6	3.81
Park City	.....	.....	.....	0.66
Price†	.....	.....	.....	0.80
Promontory*	84	30	51.8	0.10
Provo City	.....	.....	.....	1.12
Richfield†	85	26	51.4	0.47
Saint George†	99	34	61.6	0.82
Stockton	.....	.....	.....	2.14
Terrace*	75	40	57.5	0.75
Vermont.				
Brattleborough (1)	71	19	45.8	4.44
Brattleborough (2)	70	21	45.2	.....
Burlington	60	22	42.2	3.32
Chelsea*	57	16	39.8	3.57
Cornwall	.....	.....	.....	3.36
East Berkshire†	62	12	39.9	4.25
Hartland	69	13	44.1	4.75
Jacksonville	67	13	41.1	4.31
Lunenburgh*	68	15	43.4	3.58
Manchester*	64	23	43.6	3.95
Saint Johnsbury*	60	13	39.2	3.57
Saxton's River	70	13	43.2	4.31
Strafford*	60	22	43.6	2.90
Vernon	68	22	45.8	4.64
Weatherford Cen.	64	0	33.2	.....
Virginia.				
Abingdon†	.....	.....	.....	1.69
Birdsnest*	83	41	56.6	7.50
Bolar*	78	22	44.2	4.05
Christiansburgh†	76	30	51.8	2.27
Dale Enterprise†	80	26	52.8	4.28
Fort Monroe	78	38	57.5	7.72
Fort Myer	80	32	52.3	4.32
Lexington†	79	26	50.7	4.75
Liberty	.....	39	52.8	3.86
Middletown†*	76	33	54.6	4.34

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Virginia—Cont'd.	°	°	°	*Ins.*
Mossingford †	.....	36	52.2	4.76
Nottaway C. H.	82	30	59.6	4.66
Petersburgh †	79	35	54.5	5.43
Richmond †	87	31	55.7	5.23
Smithfield *	82	35	56.3	8.17
Spottsville*	80	32	55.4	7.25
Summit	78	27	49.9	.....
University of Va	.....	.....	.....	4.50
Woodstock †	.....	.....	.....	4.07
Washington Territory				
Blakeley †	70	37	53.4	2.94
Fort Canby	72	46	58.0	4.46
Fort Spokane	86	31	53.4	2.00
Fort Townsend	68	36	52.5	2.18
Fort Walla Walla	79	35	55.2	0.70
Vancouver B'ks	75	37	56.4	4.28
Vashon	74	43	56.6	1.29
West Virginia.				
Buckhannon †	.....	.....	.....	4.54
Charleston †	.....	.....	.....	3.39
Ella*	70	29	48.2	2.31
Glenville †	.....	.....	.....	3.08
Harper's Ferry †	.....	.....	.....	3.87
Hinton †	.....	.....	.....	1.34
Kingwood *	73	26	48.5	.....
Morgantown †	.....	.....	.....	3.34
Pleasant Hill *	78	24	47.5	.....
Point Pleasant †	.....	.....	.....	3.15
Rowlesburgh (1) †	.....	.....	.....	2.36
Rowlesburgh (2)*	.....	26	45.0	2.90
Seven Pines	74	22	50.0	.....
Tannery *	75	28	45.3	.....
Tyler Creek *	76	31	55.4	2.84
Weston †	.....	.....	.....	3.54
Wheeling †	.....	.....	.....	2.02
Wisconsin.				
Butternut*	.....	20	35.8	0.38
Cadis *	.....	24	42.0	.....
Chippewa Falls †	.....	.....	.....	0.05
Wisconsin—Cont'd.	°	°	°	*Ins.*
Delavan	73	21	43.6	0.14
Embarrass*	75	25	43.2	0.40
Fond du Lac	72	19	41.8	0.12
Friendship *	.....	22	42.8	T.
Glasgow †*	.....	24	39.8	.....
Grantsburgh †	77	21	41.4	T.
Greenwood †	70	16	40.0	0.00
Haywood † *	74	28	39.8	0.36
Honey Creek*	78	32	48.4	0.25
Lincoln *	.....	34	43.2	1.16
Madison	76	29	46.2	T.
Manitowoc	62	26	45.4	0.28
Medford †	.....	.....	.....	0.05
Neillsville*	78	14	38.8	0.00
Phillips †	.....	.....	.....	0.35
Portage †	.....	.....	.....	0.16
Richland Centre †	79	14	43.7	T.
Summit Lake*	86	18	38.4	1.00
Viroqua*	.....	23	40.6	T.
Wausau †	77	11	39.6	0.06
Wauzeka *	88	28	45.0	T.
Wyoming.				
Bordeaux	.....	.....	.....	0.95
Carter †	.....	.....	.....	1.30
Carbon*	77	18	43.2	0.62
Camp Pilot Butte	83	11	43.1	0.52
Camp Sheridan	79	18	44.5	1.32
Evanston	94	24	46.8	1.35
Fort Bridger	80	20	43.9	1.12
Fort D. A. Russell	94	15	49.2	4.80
Fort Laramie	91	21	50.1	1.48
Fort McKinney	83	14	47.2	0.86
Fort Washakie	82	23	47.2	0.77
Lusk †	80	21	45.6	0.57
Saratoga*	78	20	47.0	2.70
Wheatland †	70	.....	.....	0.32
West Indies.				
Hamilton, Bermuda	80	62	73.6	7.13
Havana, Cuba	88	66	76.6	7.56

Reports received too late for publication in September.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Alaska.				
Killisnoo	63	31	47.3	5.75
Arizona.				
Ash Canyon	.....	.....	.....	4.35
Dudleyville	.....	.....	.....	1.55
Eagle Pass ‡	.....	.....	70.7	2.10
Fairbank	.....	.....	.....	1.07
Gillette	.....	.....	.....	0.00
Maricopa *	98	65	63.6	0.90
Pinedale	.....	.....	.....	1.55
Total Wreck	.....	.....	.....	0.92
Tucson *	93	70	80.4	3.00
Whetstone Mount's	.....	.....	.....	1.25
Woodruff	.....	.....	.....	0.81
Arkansas.				
Dardanelle †	.....	.....	.....	4.20
California.				
Caliente *	90	60	73.7	0.00
Delta *	102	44	70.8	0.00
Dunsmuir *	98	42	62.6	0.00
Fresno *	110	58	84.6	0.00
Fruto *	106	63	82.9	0.00
Galt *	94	58	72.2	0.00
Glen Ellen *	100	42	66.1	0.00
Indio *	112	65	88.0	0.00
Lewis Creek *	104	57	80.0	0.00
Mount Hamilton	88	47	66.9	0.00
Orland *	105	56	80.3	0.00
Pleasanton *	98	52	71.7	0.60
Porterville *	110	62	81.8	0.00
Upper Mattole *	101	38	62.9	0.39
Vina *	102	50	74.9	0.00
Colorado.				
Elkhorn	.....	.....	.....	0.57
Platoro	.....	.....	.....	1.33
Connecticut.				
Hartford (1)	83	37	61.2	3.12
Lake Konomoc	.....	.....	.....	5.36
Southington *	85	38	61.9	4.44
Dakota.				
Brookings	89	30	55.5	2.70
Georgia.				
Quitman	.....	.....	.....	7.60
Indiana.				
Huntertown * m	90	56	71.4	0.38
Indian Territory.				
Caddo Creek *	94	44	70.3	.....
Jimtown *	.....	46	72.5	7.31
Iowa.				
Humboldt	87*	26	59.8	1.01
Iowa City	82	36	61.2	3.13
Osage	.....	.....	.....	1.49
Kansas.				
Grenola	96	40	64.9	4.20
Kentucky.				
Frankfort (1)	.....	.....	.....	7.01
Massachusetts.				
Boston	.....	.....	.....	4.28
Fall River (2)	82	41	63.4	5.02
Mystic Lake	.....	.....	.....	4.80
Mystic Station	.....	.....	.....	4.86
Massachusetts—Con.				
South Hingham	.....	.....	.....	4.67
Taunton (3)	83	34	62.7	3.32
Nebraska.				
Kimball	100	25	61.0	0.00
Lincoln	90	36	62.5	2.41
Nevada.				
Battle Mountain *	89	45	63.5	0.00
New Mexico.				
Antelope Springs	.....	.....	.....	0.52
Bernalillo	.....	.....	.....	1.10
Cabezon	.....	.....	.....	0.30
Camp Good Hope	.....	.....	.....	0.63
Cañon de Chama	.....	.....	.....	1.67
Cuba	.....	.....	.....	0.44
El Rito	.....	.....	.....	3.90
Embudo	.....	.....	.....	1.19
Jaquez	.....	.....	.....	1.05
Laguna	.....	.....	.....	0.09
Lamy	.....	.....	.....	1.60
Los Lunas	96	41	67.2	0.52
Magdalena	.....	.....	.....	0.43
Pojuaque	.....	.....	.....	1.23
Polvadero Tract	.....	.....	.....	1.72
Ojo Caliente	.....	.....	.....	0.92
Rio Hondo	.....	.....	.....	1.85
San Marcial	.....	.....	.....	1.02
San Marcial (near)	.....	.....	.....	2.55
San Pedro	.....	.....	.....	0.35
Spader's Ranch	.....	.....	.....	2.14
Taos	.....	.....	.....	1.22
Tres Piedras	.....	.....	.....	0.80
New Jersey.				
South Orange	83	40	62.8	12.39
Tom's River	87	40	64.5	10.01
New York.				
Central Park, N.Y.C.	82	46	65.2	6.92
Potsdam *	87	38	61.3	3.05
North Carolina.				
Clarkton*	92	41	70.3	.....
Clear Creek*	84	44	70.7	5.10
Fayetteville	.....	.....	67.4	3.68
Franklin	84	33	64.9	4.75
Highlands	79	30	59.8	8.90
Hot Springs	86	41	67.0	.....
Monroe	86	44	69.4	5.93
Morganton	88	40	66.5	4.89
Mount Airy	87	35	66.2	5.01
Pittsborough	85	40	66.7	2.50
Salisbury	87	46	71.4	3.40
Southern Pines m	90	48	70.4	2.50
Statesville	86	42	68.4	4.78
Winslow *	85	40	68.4	3.90
Pennsylvania.				
Aqueduct *	83	41	63.7	3.55
Petersburgh *	90	31	61.1	3.55
Tuscarora *	85	43	65.3	5.52
Rhode Island.				
Providence (1)	81	43	63.0	5.23
Texas.				
Santa Maria	.....	.....	.....	1.39

Reports received too late for publication in September—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Texas—Cont'd.	°	°	°	*Ins.*
Weatherford	94	60	71.7	6.02
Utah.				
Blue Creek	93	45	66.4	0.35
Mexico.				
Mazatlan f	87	77	82.6	2.68
Mexico	75	45	63.0	3.34
West Indies.	°	°	°	*Ins.*
Hayti.				
Port au Prince	94	69	81.3	8.89
South America.				
Colony of Surinam.				
Burnside Coronie	93	70	81.0	2.33
Paramaribo	97	68	82.5	3.78

Reports received too late to be used in general discussion of weather for October, 1889.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Alaska.				
Killisnoo	55	31	41.8	4.70
Arizona.				
American Flag	.....	.....	.....	0.50
Ariz. Can. Co. Dam	.....	.....	.....	0.12
Bisbee	.....	.....	.....	0.38
Chloride	.....	.....	.....	0.85
Crittenden	.....	.....	.....	0.30
Duncan	.....	.....	.....	0.20
Gillette	.....	.....	.....	1.90
Oro	.....	.....	.....	1.22
Red Rock	.....	.....	.....	0.00
Saint Johns	.....	.....	.....	0.06
Show Low	.....	.....	.....	0.42
Silver King	.....	.....	.....	1.17
Simmons	.....	.....	.....	0.29
Tempe	.....	.....	.....	1.55
Tres Alamos	.....	.....	.....	0.46
Wood Cañon	.....	.....	.....	0.70
Woodruff	.....	.....	.....	0.20
Arkansas.				
Dardanelle	.....	.....	.....	1.85
California.				
Anderson	96	37	61.6	12.32
La Grange	92	42	64.4	4.00
Lewis Creek *	93	50	66.0	4.54
Walnut Creek	95	43	62.0	4.75
Wheatland	93	41	60.9	6.41
Colorado.				
Platoro	.....	.....	.....	2.30
Dakota.				
Brookings	76	24	43.7	T.
Indian Territory.				
Caddo Creek	88	44	69.6	.....
Mexico.				
La Logia *	96	60	74.5	3.30
New Mexico.				
Cabezon	.....	.....	.....	0.95
Camp Good Hope	.....	.....	.....	0.70
Cañon de Chama	.....	.....	.....	0.70
El Rito	.....	.....	.....	1.05
Embudo	.....	.....	.....	1.16
Jaquez	.....	.....	.....	0.65
Monero	.....	.....	.....	1.55
Laguna	.....	.....	.....	2.00
Magdalena	.....	.....	.....	0.36
Ojo Caliente	.....	.....	.....	1.20
Pojuaque	.....	.....	.....	0.75
Polvadero Tract	.....	.....	.....	0.93
San Pedro	.....	.....	.....	0.90
Taos	.....	.....	.....	0.78
Tres Piedras	.....	.....	.....	0.82
Wallace	.....	.....	.....	0.70
New York.				
Constableville *	60	15	38.4	4.58
Kingston	74	20	47.6	4.12
North Carolina.				
Highlands	74	20	48.4	0.80
Mount Airy	80	26	53.6	1.16
Texas.				
Burnet †	88	48	68.0	1.44
Temple †	.....	.....	.....	3.67
Benjamin †	95	42	63.9	3.57
Wisconsin.				
Horicon *	.....	18	38.8	0.12
West Indies.				
Hayti.				
Port au Prince	93	69	80.8	8.00

* Extremes of temperature from observed readings.

† Signal Service instruments.

‡ One observation daily at 10.00 a. m.

Letters of the alphabet denote the number of days missing from the record, thus: the letter *c* indicates three days missing in a thirty-one day month, etc., etc.

Corrections for September miscellaneous table:—

Tres Alamos, Ariz., for total precipitation, 2.84, read, 0.58.

Cottonwood, Ariz., for total precipitation, 1.10, read, 0.40.

Precipitation (inches and hundredths) observed at De Soto, Nebr., by Charles Seltz, voluntary observer.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1867	.....	.....	.....	.....	8.20	5.48	3.50	1.39	1.82	1.09	.....	0.62	.....
1868	0.70	0.79	2.72	3.16	4.52	4.13	3.39	2.45	3.27	2.17	1.18	2.63	31.11
1869	0.60	1.48	0.28	2.21	4.19	8.58	8.60	6.25	9.74	0.80	1.13	3.63	47.49
1870	0.35	0.12	1.36	1.79	5.22	2.23	.....	2.39	11.83	0.88	0.07	0.13	.....
1871	0.54	1.37	0.82	4.84	3.51	4.29	8.33	3.07	3.41	1.90	3.82	1.18	37.08
1872	0.21	2.52	1.68	2.83	6.83	2.56	6.56	2.49	4.19	3.15	1.05	0.28	34.35
1873	1.21	0.19	0.45	2.69	3.43	4.01	3.09	1.14	0.93	1.49	0.06	.....	.....
1874	0.34	1.20	1.21	.....	1.60	5.01	2.35	1.54	5.56	2.01	1.39	0.62	.....
1875	0.48	1.31	2.80	2.50	4.31	5.70	5.62	8.45	4.39	0.86	0.90	2.01	39.33
1876	0.36	1.58	1.66	1.99	1.75	2.92	9.42	6.89	7.31	0.46	0.97	0.23	35.54
1877	1.27	0.60	0.73	5.04	8.06	4.10	1.78	3.94	1.74	3.55	0.80	1.69	33.39
1878	0.98	0.18	2.13	1.90	7.36	7.27	5.71	3.85	1.71	0.56	0.49	0.28	32.42
1879	0.15	0.85	1.43	.....	.....	5.17	2.10	1.76	1.01	4.22	1.56	1.20	.....
1880	1.08	0.13	0.65	0.47	2.75	4.13	3.19	5.31	2.50	1.95	0.55	0.27	22.98
1881	0.90	2.59	1.35	3.58	8.09	3.99	6.35	1.03	2.58	5.14	0.99	1.06	37.65
1882	0.79	0.80	0.15	2.98	3.48	7.31	4.23	1.41	0.38	2.01	1.15	1.28	25.97
1883	1.21	0.99	0.90	1.53	5.16	7.13	2.69	4.66	2.64	3.05	0.52	0.87	31.35
1884	0.65	1.23	3.20	2.39	1.81	3.99	7.87	5.95	8.11	4.52	0.12	1.20	41.04
1885	0.65	0.73	0.28	3.52	3.70	4.26	3.55	4.07	1.57	2.01	1.34	1.73	27.41
1886	2.24	0.41	3.16	2.27	2.16	1.62	0.70	2.71	3.53	2.74	1.70	1.56	24.80
1887	0.33	0.81	0.52	1.01	1.39	4.94	1.17	3.36	2.80	1.33	1.01	1.27	19.94
1888	0.95	0.64	4.77	3.93	4.94	3.34	5.37	5.58	0.64	1.00	0.13	1.72	33.01
1889	1.18	0.23	0.53	1.22	2.94	0.37	3.49	1.42	.....	.....	.....	.....	.....
Mean	0.78	0.94	1.49	2.59	4.34	4.72	4.50	3.38	3.71	2.13	1.00	1.21	31.25

Table of miscellaneous meteorological data for October, 1889—Signal Service observations.

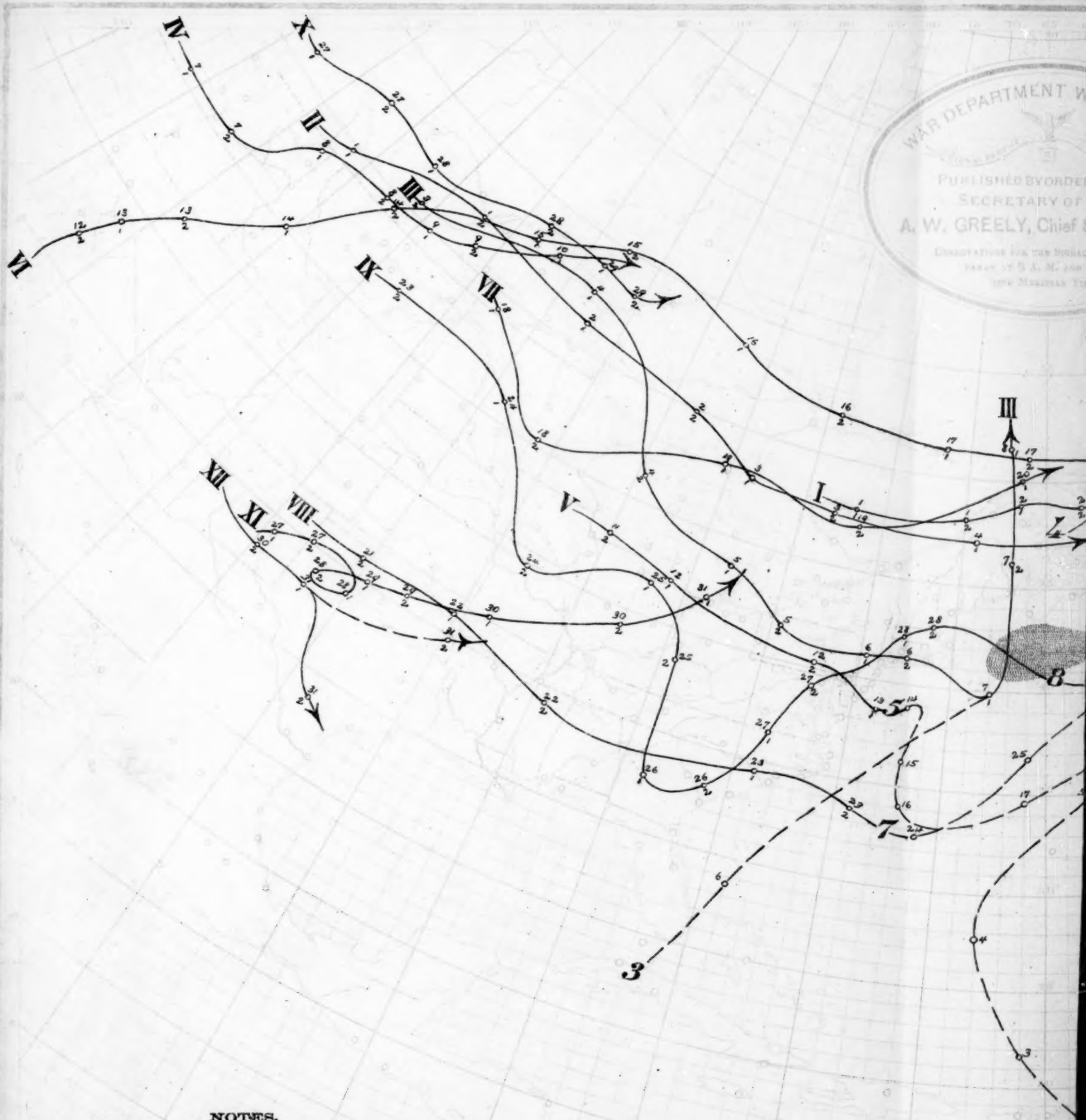
Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.								Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind.					Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths.		Temper'ture data since opening of station.			
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.					Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					8 a. m.	8 p. m.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
New England.					46.6	— 3.3									4.30	+ 0.23															
Eastport	53	29.96	30.02	0.90	55.8	— 1.2	58	50.1	29	41.5	17	3	38.2	76.8	5.02	+ 0.51	8,296	ne.	48	se.	7	7	7	17	13	6.1	4.8	16	80	1879	24	1881
Portland	99	29.91	30.02	0.94	46.2	— 2.8	68	52.8	26	39.5	23	4	38.7	80.2	3.47	— 0.25	6,196	n.	36	s.	1	8	10	13	10	5.2	5.6	18	83	*	26	1889
Manchester	247	29.78	30.04	0.92	45.9	.....	71	54.5	22	37.3	34	3	37.0	77.8	3.52	.....	3,807	nw.	19	nw.	2	8	12	11	13	5.3	5.5	3	72	1887	22	1889
Northfield	871	29.11	30.07	0.96	40.2	.....	63	49.0	12	31.4	36	2	33.5	81.6	3.57	.....	5,243	s.	30	n.	22	4	10	17	15	6.5	6.5	3	70	1887	12	1889
Boston	125	29.90	30.04	0.88	48.5	— 3.5	74	54.5	32	42.5	25	5	39.6	74.0	3.83	+ 0.09	8,244	n.	36	sw.	1	8	10	13	10	5.5	5.9	19	89	1881	25	1879
Nantucket	14	30.00	30.01	0.88	52.0	.....	68	56.5	41	47.4	18	2	48.5	86.1	6.58	.....	10,391	ne.	46	ne.	13	10	9	12	8	6.3	5.3	3	68	1889	35	1888
Wood's Holl	22	30.01	30.03	0.80	50.8	.....	65	56.0	35	45.5	17	4	44.6	81.6	4.49	+ 1.29	11,354	ne.	60	w.	10	12	6	13	9	5.1	5.3	12	77	1879	32	1876
Vineyard Haven	.....	.....	.....	.....	53.2	.....	69	59.7	37	46.7	19	5	.....	.....	2.78	.....	.....	sw.	.....	.....	.....	15	6	10	9	.....	.....	3	72	1887	33	1888
Block Island	26	30.00	30.03	0.80	51.2	— 3.8	66	56.0	36	46.5	15	4	47.0	84.1	3.11	— 1.62	15,638	ne.	78	ne.	14	9	7	15	17	5.8	5.9	10	75	1881	33	1884
Narragansett Pier	22	.....	.....	.....	49.0	— 4.0	68	56.8	31	41.1	26	5	.....	.....	5.23	+ 0.65	.....	*	.....	.....	.....	10	10	11	12	.....	.....	8	79	1884	25	1886
New Haven	107	29.92	30.04	0.83	48.8	— 4.2	72	56.3	28	41.3	29	5	40.1	76.9	3.99	+ 0.26	6,902	ne.	40	ne.	15	4	12	15	14	6.4	5.7	17	86	1881	24	1879
New London	47	29.96	30.01	0.82	50.2	— 3.8	68	56.6	31	43.8	22	3	42.8	77.2	5.25	+ 0.90	5,904	n.	27	ne.	15	7	10	14	13	6.4	5.9	18	83	1879	27	1883
Mid. Atlantic States.					53.5	— 3.3									4.61	+ 1.39															
Albany	85	29.98	30.07	0.97	48.7	— 3.3	71	57.9	28	39.5	32	6	38.8	79.6	3.48	+ 0.33	5,626	n.	28	nw.	15	4	14	13	12	6.7	6.2	16	84	1881	23	1876
New York City	185	29.84	30.04	0.80	52.0	— 5.0	73	58.6	35	45.4	23	4	41.9	72.9	2.53	— 0.77	9,005	nw.	34	e.	27	5	13	13	14	6.2	5.6	19	88	1881	31	1876
Harrisburg	361	29.69	30.08	0.90	50.2	.....	76	57.8	29	42.5	34	3	42.1	79.6	3.33	.....	5,114	n.	31	nw.	2	7	11	13	13	6.1	6.0	2	76	1889	29	1889
Philadelphia	117	29.94	30.06	0.84	52.8	— 5.2	79	60.1	32	45.4	26	4	41.8	72.2	3.76	+ 1.01	8,587	nw.	38	ne.	16	10	7	14	13	5.9	5.5	19	87	*	31	1887
Atlantic City	53	29.98	30.03	0.79	51.8	— 6.2	71	57.5	37	46.1	24	3	46.0	81.4	3.02	— 0.22	9,929	n.	48	ne.	15	12	5	14	14	4.9	5.0	16	83	1884	29	1879
Baltimore	76	29.96	30.05	0.84	53.8	— 5.2	82	60.9	34	46.6	29	4	41.8	68.5	4.12	+ 1.27	4,669	ne.	24	n.	7	9	9	13	12	6.2	5.5	18	89	1879	30	*
Washington City	112	29.95	30.07	0.84	52.5	— 5.5	82	60.9	34	44.1	35	3	43.2	76.8	4.48	+ 1.40	4,687	nw.	30	nw.	1	8	8	15	10	6.1	5.3	19	92	1879	26	1873
Lynchburgh	658	29.36	30.08	0.73	54.4	— 5.6	81	64.0	33	44.9	37	4	42.5	73.6	4.90	+ 1.79	3,173	n.	22	n.	27	14	8	9	9	5.0	3.9	17	91	1884	28	1879
Norfolk	69	29.98	30.05	0.70	57.7	— 5.3	81	65.9	40	50.4	26	4	48.2	77.0	7.56	+ 3.85	6,776	nw.	42	sw.	27	12	9	10	12	4.0	4.3	19	89	1884	31	1876
S. Atlantic States.					62.8	— 4.0									2.39	— 2.12															
Charlotte	808	29.24	30.09	0.62	58.5	— 3.5	82	69.8	34	47.2	32	11	46.3	72.3	1.53	— 2.23	3,821	n.	24	n.	23	16	11	4	4	3.4	4.2	10	92	1884	30	1879
Hatteras	11	30.03	30.05	0.60	61.0	— 6.0	78	65.7	46	56.2	18	5	54.8	82.2	4.84	— 2.01	11,484	n.	70	n.	24	21	3	7	8	3.6	2.7	9	90	1881	42	1887
Raleigh	375	29.67	30.07	0.72	57.6	.....	82	67.7	34	47.5	31	7	47.2	76.2	3.41	.....	4,783	n.	30	n.	23	15	5	11	8	3.7	3.5	3	82	*	33	1888
Southport	.....	.....	.....	.....	62.6	— 2.4	81	69.5	40	55.6	23	7	.....	.....	4.98	0.00	.....	n.	.....	.....	.....	17	6	8	5	.....	.....	14	86	1884	35	1876
Wilmington	52	30.00	30.06	0.59	60.9	— 5.1	83	70.0	37	51.8	30	8	54.0	84.6	3.87	— 0.16	4,567	n.	20	w.	27	16	8	7	7	3.3	3.2	9	19	91	1884	32	1876
Charleston	52	30.02	30.07	0.55	64.7	— 3.3	86	73.4	43	56.0	25	8	55.7	79.7	0.73	— 3.80	5,015	n.	30	n.	6	20	8	3	3	2.9	1.5	17	92	1883	39	1873
Columbia	.....	.....	.....	.....	62.9	.....	84	74.0	36	51.8	33	12	.....	.....	3.62	.....	.....	n.	.....	.....	.....	18	10	3	3	.....	.....	3	85	1887	36	*
Augusta	183	29.91	30.11	0.61	62.8	— 3.2	88	76.1	36	49.5	38	9	51.1	79.2	1.59	— 0.80	2,253	w.	27	n.	14	21	8	2	3	1.6	2.2	17	93	1884	29	1873
Savannah	87	29.99	30.08	0.56	64.3	— 3.7	87	74.5	42	54.1	26	12	53.0	75.8	0.34	— 3.45	4,411	n.	22	n.	15	18	11	2	2	1.8	1.6	19	92	1884	37	1873
Jacksonville	43	30.03	30.08	0.44	67.3	— 4.7	90	77.9	45	56.7	29	8	59.4	84.8	1.26	— 4.47	4,195	n.	24	n.	15	27	4	0	1	1.1	0.6	19	92	1883	40	*
Florida Peninsula.					72.8	— 3.2									2.38	— 1.98															
Cedar Keys	22	30.05	30.07	0.41	68.8	— 4.2	85	75.9	49	61.8	22	5	60.6	78.3	1.61	— 1.40	5,950	n.	30	nw.	26	18	9	4	3	3.0	1.9	10	89	*	39	1887
Jupiter	28	30.01	30.04	0.32	73.8	.....	86	80.5	54	67.1	22	7	64.8	73.5	3.05	.....	6,299	ne.	24	ne.	11	21	7	3	4	3.7	2.4	2	86	*	54	1889
Key West	22	30.01	30.03	0.27	76.8	— 2.2	87	80.7	66	73.0	14	3	67.8	72.0	3.16	— 2.56	6,897	e.	30	ne.	5	16	10	6	9	4.1	2.5	19	92	1876	65	*
Micco	.....	.....	.....	.....	73.2	.....	88	81.7	52	64.8	32	4	.....	.....	0.19	.....	.....	ne.	.....	.....	.....	18	1	2	3	.....	.....	2	89	1888	52	1889
Titusville	44	30.03	30.07	0.37	69.4	.....	88	78.5	49	60.4	27	7	62.5	81.4	2.05	.....	2,583	nw.	38	nw.	15	19	9	3	5	1.8	1.4	3	88	*	45	1887
Eastern Gulf States.					65.5	— 3.2									0.92	— 2.16															
Atlanta	1,139	28.90	30.10	0.54	60.2	— 2.8	81	70.3	37	50.1	31	5	46.4	69.2	2.21	— 0.34	6,036	nw.	30	e.	25	18	9	4	4	2.1	1.7	12	91	1884	30	1887
Pensacola	56	30.03	30.09	0.52	67.2	— 3.8	84	75.6	47	58.7	26	8	56.2	72.9	1.79	— 1.90	6,486	ne.	38	sw.	25	19	9	3	5	2.6	1.0	10	95	1884	38	1887
Auburn	.....	.....	.....	.....	62.2	.....	82	73.5	38	51.0	32	8	.....	.....	1.52	.....	.....	nw.	.....	.....	.....	21	7	3	2	.....	.....	2	82	1889	38	1889
Mobile	35	30.07	30.11	0.42	66.0	— 4.0	85	76.8	43	55.3	29	12	55.8	79.6	0.08	— 3.31	5,106	n.	24	nw.	26	20	9	2	4	3.3	1.0	19	93	1884	34	*
Montgomery	217	29.87	30.10	0.60	63.8	— 4.2	87	75.9	39	51.7	35	4	50.0	71.0	1.01	— 1.40	2,716	n.	21	nw.	6	20	9	2	3	2.7	1.2	18	96	1884	32	1887
Meridian	358	29.73	30.12	0.56	62.5	.....	88	76.4	32	48.6	40	2	48.5	74.0	0.65	.....	3,297	n.	36	w.	25	23	5	3	2	2.7	1.3	1	88	1889	32	1889
Vicksburg	222	29.86	30.10	0.52	65.2	— 2.8	88	77.2	39	53.1	33	11	50.0	67.1	0.16	— 3.02	3,907	n.	32	nw.	25	21	9	1	3	2.7	1.3	18	93	1884	34	1887
University	.....	.....	.....	.....	61.0	.....	82	72.5	38	49.5	30	9	.....	.....	0.59	.....	.....	n.	.....	.....	.....	10	18	3	4	.....	.....	3	85	1887	31	1887
New Orleans	52	30.04	30.10	0.49	70.4	— 1.6	90	80.0	50	60.8	28	11	56.9	73.1	0.26	— 3.00	5,182	n.	24	n.	26	26	4	1	2	1.4	0.7	19	90	*	40	1873
Port Eads	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	89	1881	58	1881
Western Gulf States.					67.1	— 1.4									0.99	— 2.52															
Shreveport	249	29.84	30.10	0.60	65.5	— 2.5	86	77.0	39	54.0	33	11	52.6	72.0	1.06	— 2.61	4,546	ne.	38	nw.	30	27	3	1	2	1.6	0.8	17	95	1883	31	1873
Fort Smith	470	29.61	30.11	0.68	63.6	— 1.4	87	74.8	31	50.5	35	9	47.8	69.2	0.70	— 2.79	1,487	se.	15	ne.	25	17	6	8	5	4.5	3.2	8	95	1884	31	*
Little Rock	309	29.78	30.11	0.64	60.8	— 4.2	82	71.1	36	50.5	32	5	49.6	74.4	1.99	— 0.65	3,849	ne.	24	ne.	22	20	9	2	3	2.4	1.3	11	90	*	33	*
Corpus Christi	20	30.06	30.08	0.52	73.0	— 1.0	88	79.4	54	66.6	20	5	65.7	79.8	0.48	.....	7,404	se.	38	se.	31	10	17	4	6	2.9	1.6	3	88	1889	49	1887
Galveston	44	30.06	30.10	0.39	72.2	— 0.8	85	77.6	56	66.7	17	6	62.4	75.6	T.	— 5.23	6,355	ne.	36	n.	26	28	2	1	0	1.0	0.9	19	87	*	45	1873
Palestine	511	29.57	30.11	0.56	66.5	— 0.5	89	78.5	38	54.5	33	14	56.4	78.6	1.21	— 2.54	4,011	se.	32	se.	29	16	10	5	2	2.7	1.9	8	94	1883	37	1888
San Antonio	781	29.27	30.09	0.55	69.4	+ 0.4	91	80.8	42	58.1	35	4	55.9	73.4	0.97	— 1.27	4,618	ne.	24	ne.	25	18	10	3	3	2.8	1.9	11	98	1877	40	1888
Rio Grande Valley.					75.6	0.0									0.86	— 3.00															
Brownsville	57	30.01	30.07	0.46	75.6	— 0.4	89	84.6	49	66.5	34	12	67.2	85.2	0.20	— 5.41	3,098	se.	32	s.	31	23	7	1	2	1.7	1.3	14	95	1877	49	*
Rio Grande City	230	29.85	30.09	0.58	75.5	+ 0.5	94	87.7	46	63.3	40	9	64.4	80.6	1.52	— 0.60	4,026	se.	34	se.	1	19	10	2	5	3.1	2.5	12	104	1877	43	*
Ohio Val. & Tenn.					54.5	— 4.9									1.64	— 1.33															
Chattanooga	783	29.30	30.14	0.61	58.4	— 4.6	82	69.4	35	47.4	35	3	47.7	77.4	1.38	— 1.88	3,767	n.	24	n.	14	16	8	7	8	4.0	2.1	11	91	1884	32	1887
Knoxville	980	29.09	30.14	0.60	55.4	— 5.6	80	65.8	30	45.1	33	2	44.8	76.0	1.81	— 1.28	3,672	ne.	20	n.	7	15	9	7	7	4.1	3.0	19	94	1884	25	1876
Memphis	349	29.76	30.14	0.70	60.8	— 3.2	84	70.9	38	50.7	28	4	47.0	69.5	0.75	— 2.58	4,665	n.	28	n.	12	17	10	4	3	3.3	1.7	17	92	*	29	1878
Nashville	553	29.52	30.10	0.61	57.2	— 4.8	83	68.4	30	45.9	36	5	44.6	72.6	1.54	— 1.26	3,612	n.	28	nw.	13	18	7	6	6	3.6	3.1	19	91	1884	27	1887
Lexington	.....	29.15	.....	0.71	52.3	.....	74	60.9	29	43.7	32	4	41.6	71.8	3.06	.....	7,713	sw.	36	sw.	1	10	8	13	8	6.2	4.2	2	74	*	29	1889
Louisville	551	29.54	30.13	0.70	56.0	— 4.0	81	65.8	31	46.2	35	7	41.3	64.4	1.68	— 1.47	4,339	n.	27	w.	1	21	2	8	6	4.6	3.1	18	90	1884	26	1887
Indianapolis	766	29.31	30.13	0.76	50.8	— 4.2	80	59.8	29	41.8	33	3	36.9	66.8	1.70	— 1.38	3,767	n.	22	nw.	1	13	9	9	5	5.6	2.7	16	87	1884	22	1887
Cincinnati	628	29.46	30.14	0.67	51.6	— 6.4	80	59.7	30	43.4	32	4	40.4	70.6	2.03	— 0.64	5,119	n.	26	n.	6	13	4	14	8	5.1	3.2	19	87	1884	26	1887
Columbus	837	29.22	30.14	0.65	49.0	— 6.0	78	57.3	29	40.8	32	4	37.0	69.6	1.83	— 1.09	4,932	n.	26	w.	1	12	8	11	9	5.4	4.2	12	87	1884	20	1887
Pittsburgh	847	29.17	30.09	0.64	51.0	— 5.0	75	59.3	30	42.7	33	2	41.3	75.8	2.06	— 0.38	3,296	n.	21	nw.	1	7	10	14	14	6.9	5.0	17	91	1879	20	1887
Parkersburgh	638	29.43	30.13	0.61	50.0	.....	77	59.7	24	40.3	37	3	41.1	79.9	1.87	.....	3,881	nw.	24	nw.	1	13	7	11	8	5.7	4.2	2	77	1889	24	1889
Lower Lake Region.					46.2	— 6.3									2.31	— 0.86															
Buffalo	690	29.33	30.08	0.94	45.2	— 5.8	62	51.5	26	38.9	25	2	36.0	74.6	2.80	— 1.96	6,945	n.	39	sw.	9	9	9	13	13	6.3	5.4	17	83	1879	24	1887
Oswego	335	29.68	30.05	1.00	43.9	— 6.1	67	49.5	24	38.3	25	4	37.0	78.7	3.57	+ 0.25	8,138	ne.	32	n.	28	7	3	21	13	7.7	6.1	19	84	1877	24	*
Rochester	621	29.40	30.08	0.97	43.9	— 7.1	67	50.1	23	37.7	29	2	36.4	77.9	4.02	+ 0.97	6,654	w.	28	nw.	8	5	10	16	15	7.2	5.5	19	87	1879	19	1879
Erie	714	29.31	30.09	0.86	46.2	— 7.8	69	52.3	30	40.2	27	3	38.0	74.7	3.37	— 0.98	8,642	sw.	36	nw.	1	7	9	15	12	7.6	5.4	17	85	1879	26	1887
Cleveland	751	29.32	30.11	0.74	47.6	— 6.4	72	53.8	29	41.3	30	4	38.2	71.9	1.56	— 1.31	6,787	n.	30	nw.	1	11	2	18	11	6.9	5.7	18	87	1879	24	1887
Sandusky	629	29.43	30.11	0.80	48.3	— 5.7	76	54.9	27	41.7	33	3	37.0	68.6	1.27	— 1.52	7,827	n.	34	nw.	5	9	8	14	8	6.6	4.9	13	86	1879	24	1887
Toledo	673	29.41	30.14	0.81	47.8	— 5.2	78	56.3	26	39.4	30	5	33.4	63.9	0.84	— 1.84	6,206	ne.	28	sw.	1	10	2	9	7	6.5	3.8	19	86	1872	21	1887
Detroit	662	29.40	30.12	0.91	46.9	— 6.1	76	54.4	25	39.4	31	3	35.5	71.3	1.05	— 1.51	7,464	nw.	34	nw.	6	8	10	13	5	6.8	5.1	19	86	1879	22	1887
Upper Lake Region.					43.7	— 4.6									1.04	— 2.45															
Alpena	609	29.47	30.14	1.05	40.5	— 5.5	62	46.9	20	34.1	30	1	32.8	77.4	1.70	— 2.73	6,292	nw.	33	nw.	1	3	13	15	10	7.4	4.9	17	83	1884	15	1887
Escanaba	608	.....	.....	.....	41.0	— 4.0	60	48.4	20	33.6	32	1	.....	.....	1.10	— 2.08	.....	*	.....	.....	.....	10	6	15	3	.....	.....	16	78	1884	11	1887
Grand Haven‡	621	29.46	30.15	0.92	44.2	— 5.8	64	53.4	24	35.1	31	5	34.8	78.8	0.47	— 3.41	*1,915	ne.	.....	sw.	1	12	3	8	4	4.9	3.8	17	80	1879	20	1887
Lansing	883	29.20	30.16	0.88	44.4	.....	74	53.6	21	35.3	34	4	35.2	78.9	0.79	.....	4,909	ne.	24	nw.	5	7	9	15	7	6.0	5.5	3	75	1887	20	1887
Manistee	615	29.47	30.15	0.90	42.1	.....	59	48.3	22	35.9	26	1	34.5	78.2	0.45	.....	5,108	n.	24	nw.	5	12	8	11	8	4.6	4.8	2	81	1888	22	1889
Marquette	735	29.35	30.16	0.80	40.6	— 5.4	67	46.6	24	34.5	30	4	33.2	79.5	0.78	— 2.82	6,415	nw.	30	n.	5	5	8	18	10	6.9	6.9	16	87	1879	12	1887
Port Huron	639	29.43	30.13	0.98	44.6	— 5.4	68	51.5	26	37.6	31	1	35.5	74.4	1.56	— 1.36	9,034	nw.	42	n.	6	4	7	20	8	7.5	6.6	16	86	1879	20	1887
Sault de Ste. Marie	642	29.43	30.15	1.09	39.0	.....	57	45.1	21	32.8	23	3	32.4	83.8	1.86	.....	4,102	ne.	22	nw.	1	4	10	17	10	6.1	4.7	2	60	1888	21	1889
Chicago	715	29.37	30.14	0.84	49.4	— 4.6	79	55.2	35	43.5	28	2	38.8	70.2	1.82	— 1.76	7,096	ne.	32	ne.	25	14	7	10	7	6.2	4.4	18	83	*	14	1887
Milwaukee	697	29.39	30.15	0.87	47.2	— 3.8	74	54.0	31	40.3	27	3	36.6	73.5	0.56	— 2.18	8,233	n.	38	w.	3	12	10	9	7	4.8	5.2	19	83	1871	15	1887
Green Bay	616	29.50	30.18	0.87	43.2	.....	65	51.0	26	35.3	33	4	32.5	73.4	0.26	.....	5,761	n.	30	n.	5	8	11	12	5	5.9	4.3	4	78	1886	8	1887
Duluth	672	29.43	30.18	0.80	42.3	— 2.7	70	48.4	25	36.2	28	2	32.6	73.2	0.34	— 2.63	4,658	ne.	28	nw.	5	9	13	9	6	4.5	4.3	17	80	1886	8	1887
Extreme Northwest.					44.6	+ 2.4									0.09	— 1.38															
Moorhead	926	29.13	30.16	0.72	43.6	+ 0.6	78	54.5	18	32.6	44	2	32.0	73.3	0.07	— 2.50	8,181	n.	33	s.	6	16	5	10	2	3.6	3.0	9	84	1885	6	1887
Saint Vincent	804	29.28	30.18	0.78	40.4	+ 0.4	77	51.4	9	29.3	39	6	29.8	75.0	0.18	— 1.83	7,067	n.	30	nw.	4	13	9	9	3	5.1	3.7	10	82	1886	—10	1887
Bismarck	1,681	28.29	30.12	0.81	47.5	+ 3.4	86	60.6	23	34.1	51	7	37.8	79.8	T.	— 1.19	7,519	nw.	36	nw.	18	17	6	8	0	3.6	3.4	16	88	1879	2	1887
Fort Buford	1,900	28.02	30.07	0.79	47.2	+ 5.2	89	63.0	15	31.4	51	12	27.6	57.8	0.01	— 0.98	5,894	e.	42	nw.	10	7	21	3	1	5.2	3.7	11	95	1879	0	1887
Fort Yates	.....	.....	.....	.....	49.6

Table of miscellaneous meteorological data for October, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches. Mean actual.	Mean reduced.	Monthly range.	Temperature of air, in degrees Fahrenheit. Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date	Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths. 8 a. m.	8 p. m.	Temper'ture data since opening of station. Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
Upper Miss. Valley.					50.0	— 1.0									1.42	— 1.67																	
Saint Paul	831	29.25	30.17	0.75	45.1	— 2.9	70	55.5	25	34.7	39	3	30.6	66.0	0.06	— 1.96	4,749	se.	24	w.	3	15	7	9	1	3.6	3.9	18	87	1879	12	1887
La Crosse	744	29.40	30.21	0.79	45.2	— 4.8	79	55.8	24	34.6	38	3	33.0	72.2	0.06	— 2.40	3,736	s.	28	nw.	25	14	11	6	3	3.7	3.0	17	84	1884	6	1887
Davenport	615	29.50	30.18	0.82	49.0	— 4.0	81	58.5	27	39.5	34	3	30.1	70.3	1.26	— 1.87	4,624	ne.	30	nw.	12	19	5	7	6	3.0	3.0	18	85	1879	18	1873
Des Moines	869	29.21	30.15	0.77	49.2	— 3.8	85	59.7	26	38.6	40	3	35.9	69.8	0.52	— 3.60	4,673	n.	25	nw.	25	18	6	7	6	4.2	3.3	12	86	1884	14	1887
Dubuque	651	29.46	30.18	0.83	47.6	— 3.4	79	58.3	22	37.0	42	5	39.4	82.8	0.66	— 2.48	3,241	n.	22	nw.	5	15	7	9	4	3.7	3.3	17	86	1879	15	1887
Keokuk	613	29.50	30.17	0.73	50.8	— 4.2	80	60.0	31	41.6	30	2	41.0	78.1	2.88	— 0.52	3,486	e.	24	w.	11	15	9	7	7	3.6	3.5	19	87	1879	20	1873
Cairo	359	29.74	30.13	0.77	56.6	— 4.4	83	66.0	36	47.3	29	6	46.9	79.0	2.81	— 0.14	4,722	n.	40	sw.	30	17	6	8	6	4.1	3.8	18	88	*	24	1873
Springfield, Ill	644	29.45	30.15	0.78	51.0	— 5.0	80	60.1	30	41.9	33	4	41.0	76.5	2.86	— 0.90	5,535	n.	24	e.	30	15	8	8	7	4.2	4.2	11	88	1879	20	1887
Saint Louis	571	29.54	30.15	0.76	55.1	— 3.9	84	63.5	35	46.7	33	5	41.1	65.3	1.65	— 0.15	6,966	ne.	36	se.	30	13	6	12	5	3.9	2.7	19	90	1879	24	1887
Missouri Valley.					50.8	— 0.4								*	0.86	— 0.95																	
Columbia					53.4		83	65.3	32	41.5	41	6			2.50		4,172	n.				7	14	10	8		4.5	1	83	1889	32	1889
Kansas City	947	29.13	30.15	0.73	54.8		86	63.0	32	46.6	28	2	42.6	70.8	1.57		5,076	se.	36	sw	2	14	5	12	6	3.8	4.1	2	86	1889	32	1889
Springfield, Mo	1,396	28.68	30.12	0.73	56.6		84	66.9	32	46.4	35	7	44.0	74.0	2.25		6,831	e.	36	nw.	25	13	7	11	8	4.4	4.3	4	88	1887	21	1887
Leavenworth	842	29.24	30.14	0.74	54.2	— 2.8	87	63.4	28	45.0	35	3	42.4	73.4	1.59	— 1.77	3,094	n.	24	nw.	2	12	9	10	7	4.9	3.9	19	89	1887	19	1873
Topeka					52.8		90	64.9	26	40.8	46	7			1.34			s.				11	9	11	7			3	90	1889	22	1887
Omaha	1,113	28.97	30.17	0.68	52.2	— 1.8	84	62.0	28	42.4	36	3	37.8	67.4	0.34	— 2.56	5,094	*	34	nw.	25	13	8	10	4	4.9	4.1	17	87	1870	15	1878
Crete					51.6		83	62.9	22	40.3	39	4			0.37			e.				13	5	13	3			3	90	1887	10	1887
Valentine	2,613	27.37	30.11	0.71	49.8		86	62.4	22	37.1	48	4	38.2	74.5	2.12	+ 1.53	6,920	se.	42	nw.	2	14	6	11	9	4.5	4.4	4	87	1885	3	1887
Sioux City	1,158	28.89	30.15	0.69	50.4		84	61.5	22	39.2	38	7	33.8	63.6	0.21		6,928	se.	36	sw.	4	13	9	9	6	5.0	3.9	1	84	1885	22	1889
Fort Sully	1,600	28.38	30.10	0.78	50.2	+ 2.2	85	63.1	20	37.4	45	3	33.6	63.4	0.08	— 0.62	6,745	*	31	nw.	2	16	6	9	4	4.9	3.8	12	88	1884	4	1887
Huron	1,307	28.72	30.14	0.75	46.8	— 0.2	78	59.7	17	33.9	44	7	32.7	68.4	0.55	— 1.16	7,983	se.	33	se.	6	16	7	8	9	4.4	3.2	9	85	1886	5	1887
Yankton	1,234	28.81	30.14	0.70	50.4	+ 0.4	80	62.8	22	37.9	42	7	35.8	68.7	0.48	— 1.12	4,900	se.	31	nw.	2	9	8	14	4	5.5	4.7	17	88	1879	9	1878
Northern Slope.					49.8	+ 4.4									0.87	— 0.35																	
Fort Assinniboine	2,720	27.20	30.05	0.68	49.0	+ 7.0	89	64.3	21	33.8	49	12	27.8	56.5	T.	— 0.50	7,351	sw.	57	w.	1	12	14	5	0	3.4	3.7	10	89	1889	—16	1881
Fort Custer	3,040	26.89	30.05	0.67	50.8	+ 3.8	89	65.9	23	35.6	50	12	35.0	66.2	0.50	— 0.51	4,041	se.	28	nw.	1	12	15	4	3	4.4	4.2	11	89	1889	—15	1887
Fort Maginnis	4,340				50.2	+ 7.2	87	61.1	21	39.2	40	11			0.35	— 1.28		nw.				18	8	5	1			8	87	1889	—11	1887
Helena	4,069	25.88	30.04	0.56	50.7	+ 6.7	80	61.1	30	40.3	34	6	25.9	46.7	0.14	— 0.94	4,358	sw.	34	w.	28	13	9	9	3	4.9	6.2	10	80	1889	3	1887
Rapid City	3,280	26.70	30.08	0.66	51.4		86	63.4	25	39.3	41	8	33.8	60.0	0.43	— 0.23	6,090	nw.	46	w.	2	8	15	8	6	3.8	5.2	4	86	1889	15	1881
Cheyenne	6,105	24.11	30.11	0.59	48.1	+ 3.1	81	60.3	22	35.9	42	4	24.0	53.8	2.58	+ 1.89	6,546	nw.	46	nw.	24	7	14	10	10	5.0	4.9	17	82	1887	—4	1878
Fort McKinney	5,000	25.04	30.04	0.60	5.14		84	61.0	21	41.7	34	6	27.7	49.4	0.89		7,050	w.	40	nw.	29	8	12	11	5	3.9	5.4	2	84	1889	19	1888
Fort Washakie	5,580	24.53	30.10	0.57	46.7		81	59.4	23	34.0	42	7	28.6	57.1	0.87		3,189	sw.	30	nw.	24	8	13	10	5	4.5	5.5	3	81	1889	15	1882
North Platte	2,841	27.18	30.15	0.62	49.8	— 1.2	88	62.5	23	37.2	44	4	36.6	71.0	0.31	— 0.87	6,290	se.	34	nw.	24	8	15	8	4	4.6	4.8	16	89	1879	9	1887
Middle Slope.					54.7	0.0									3.09	+ 1.96																	
Colorado Springs					50.0		81	61.8	23	38.1	42	6	32.5	62.4	2.68							18	6	7	7	4.0	4.1	3	82	1887	9	1887
Denver	5,281	24.84	30.08	0.66	51.8	+ 1.8	85	65.4	25	38.1	42	3	29.0	52.8	2.11	+ 1.38	4,468	s.	36	nw.	24	9	16	6	7	4.0	5.0	17	86	1873	1	1873
Pueblo	4,753	25.33	30.10	0.71	53.2		87	66.5	29	39.8	44	5	28.0	48.8	1.62		4,768	nw.	38	n.	29	12	10	9	5	4.5	4.1	2	87	1889	25	1888
Concordia	1,410	28.64	30.15	0.64	55.3	— 1.9	85	63.9	26	42.3	40	5	42.6	79.8	1.90	+ 0.35	4,273	se.	24	n.	25	17	5	9	6	4.7	3.4	5	92	1887	21	1887
Dodge City	2,523	27.46	30.08	0.68	55.6	— 0.4	94	66.7	28	44.5	39	3	41.6	71.4	2.88	+ 1.68	7,232	n.	33	e.	23	12	7	12	8	4.9	4.9	10	94	1889	10	1878
Wichita	1,366	28.63	30.09	0.77	56.4		91	65.9	34	47.0	34	5	44.4	73.6	2.14		5,767	n.	35	n.	25	13	8	10	9	5.4	4.3	2	91	1889	32	1888
Fort Reno					62.0		94	74.2	31	49.9	42	6			1.91							10	10	11	5			7	94	1889	28	*
Fort Supply					59.0		96	71.7	32	46.4	47	8			5.58	+ 4.24		se.				12	7	12	5			7	96	1889	24	1881
Fort Elliott	2,690	27.32	30.09	0.72	63.8	+ 0.8	94	69.8	35	47.0	46	1	46.5	76.6	2.99	+ 0.17	8,819	n.	44	n.	30	15	4	12	6	5.0	4.0	10	94	1889	25	1887
Southern Slope.					63.8	+ 0.8									1.88	— 0.66																	
Fort Sill	1,200	28.82	30.07	0.69	62.4	+ 0.4	94	74.2	35	50.6	37	3	50.2	79.1	2.82	— 0.41	7,126	s.	40	w.	29	17	8	6	6	3.7	2.3	12	94	1889	25	1878
Abilene	1,748	28.62	30.07	0.60	65.2	+ 1.2	90	76.0	43	54.4	31	3	50.4	69.4	1.22	— 1.99	7,775	s.	35	s.	9	21	5	5	4	2.5	2.1	5	93	1885	34	1887
Fort Stanton	6,150	24.07	30.01	0.62	52.8		79	67.0	23	38.7	42	3	36.8	62.3	1.90	+ 0.42	4,476	w.	35	w.	30	15	11	5	5	3.1	3.4	6	82	1885	22	1887
Southern Plateau.					61.7	+ 1.8									0.79	+ 0.05																	
El Paso	3,796	26.26	30.01	0.52	65.0	+ 1.0	89	78.9	39	51.2	41	12	37.8	44.8	0.35	— 0.96	5,053	e.	36	n.	31	24	5	2	3	1.4	1.7	12	94	1879	28	1882
Lava					59.4		85	75.4	28	43.4	44	13			0.35	— 0.35		s.				17	6	8	1			5	90	1887	28	*
Santa Fé	7,026	23.36	30.10	0.63	52.1	+ 2.1	78	63.1	28	41.1	33	7	26.0	46.7	0.37	— 0.69	4,801	e.	36	n.	27	16	11	4	4	3.1	3.7	16	85	1878	16	1880
Fort Apache	5,020				58.0	+ 3.0	88	75.2	27	40.9	45	15			0.46	— 1.08		sw.				22	5	4	4			11	88	*	19	1880
Fort Bowie					62.7		81	72.1	39	53.3	23	12			0.74	— 0.29		w.				20	2	9	2			7	98	1885	35	1883
Fort Grant	4,860	25.27	30.04	0.39	64.6	+ 2.6	88	75.4	39	53.9	30	13	38.0	42.3	0.94	+ 0.10	5,096	w.	28	w.	6	24	5	2	2	1.8	1.8	12	91	1878	33	1881
Fort McDowell					70.4		106	87.6	38	53.2	47	25			1.31	+ 0.68		sw.				21	4	6	3			6	106	1889	38	*
Fort Thomas	2,710				65.2	+ 4.2	93	81.7	33	48.6	42	21			0.26	— 0.14		se.				19	8	4	2			10	95	1887	26	1880
Fort Verde					70.1		96	78.6	34	47.6	44	9			1.74	+ 1.26		s.				19	7	5	3			13	96	*	27	1881
Phœnix					70.9		99	81.2	47	60.6	28	12			0.99	+ 0.67		w.				19	4	8	2			10	105	1885	34	1883
Whipple Barracks	5,389	24.79	30.06	0.40	54.4	+ 1.4	87	68.2	28	40.5	40	10	32.6	53.9	1.76	+ 1.25	6,109	sw.	36	sw.	8	23	4	4	4	1.8	1.9	14	87	1889	18	1880
San Carlos					63.3		95	82.1	36	44.5	47	24			0.60	— 0.03		s.				23	4	4	1			9	96	1881	29	*
Wilcox					66.8		89	79.0	30	42.2	48	14			0.83	— 0.27		w.				27	4	0	3			6	94	1887	25	1886
Yuma	141	29.79	29.93	0.29	73.6	+ 0.6	106	86.9	47	58.2	43	15	48.5	50.4	0.59	+ 0.47	3,586	n.	34	n.	31	23	6	2	2	1.5	1.7	15	108	1887	41	1883
Keeler	3,622	26.33	29.95	0.47	61.6	— 0.4	91	71.3	41	51.9	31	5	37.0	43.5	0.56	+ 0.19	5,597	se.	37	w.	26	22	5	4	6	1.6	3.2	5	91	*	34	1886
Middle Plateau.					62.4	+ 2.4									1.64	+ 0.66																	
Carson City					49.2		85	62.9	21	35.6	49	13	26.8	51.3	1.04							11	11	9	9	3.5	4.9	2	85	1889	21	1889
Winnemucca	4,340	25.67	30.05	0.73	50.9	+ 1.9	87	64.2	24	37.6	50	10	21.0	41.0	0.61	0.01	7,633	sw.	48	w.	7	6	12	13	7	4.3	4.3	11	87	*	10	1878
Fort Du Chesne	4,900	25.13	30.07	0.52	48.5		85	64.1	22	33.6	50	13	29.4	60.0	0.75		1,916	n.	36	w.	18	7	14	10	5	4.7	4.7	2	85	1889	17	1888
Salt Lake City	4,348	25.71	30.07	0.46	54.2	+ 3.2	86	64.2	30	44.2	36	6	34.6	53.6	3.85	+ 2.23	3,430	nw.	28	e.	13	12	7	12	13	4.3	4.9	16	86	1889	22	1878
Taylor's Ranch					49.3		88	62.9	23	35.7	47	13			0.91			w.				9	10	12	7			1	88	1889	23	1889
Montrose	5,795	24.36	30.05	0.49	52.2	+ 2.2	83	65.2	27	39.2	38	11	27.2	48.2	0.47	— 0.43	3,808	s.	26	ne.	31	15	13	3	7	3.6	4.1	5	83	*	19	1885
Northern Plateau.					54.1	+ 6.1									2.66	+ 1.24																	
Boisé City	2,750	27.19	30.02	0.83	55.8	+ 5.8	91	67.5	30	44.2	47	8	34.9	52.6	1.40	+ 0.09	3,376	se.	24	se.	28	4	15	12	9	5.3	3.6	13	91	1889	16	1887
Ashland					50.4		87	67.8	37	44.9	42	8			3.26	+ 1.92		*				4	6	21	12			6	93	1885	23	1884
Baker City	3,526	26.49	30.13	0.78	51.1		85	62.3	29	39.6	39	8	35.1	63.0	1.46		4,753	se.	26	s.	8	7	10	14	17	5.7	6.8	1	85	1889	29	1889
Fort Klamath					44.9		80	57.0	20	32.8	54	5			3.57	+ 2.71		s.				6	4	21	13			6	82	1885	11	1886
Linkville					48.6		74	57.6	28	39.6	34	7			2.54	+ 1.52		s.				5	6	20	16			5	80	1887	22	1887
Spokane Falls	1,941	27.97	30.02	0.87	52.4	+ 6.4	80	62.1	31	42.6	41	5	41.6	72.6	2.01	— 0.06	3,367	sw.	30	sw.	1	2	14	15	13	5.9	7.2	9	86	1889	12	1887
Walla Walla	1,018	28.92	30.01	0.95	56.2		80	65.2	37	47.1	30	4	42.4	66.0	0.88		2,451	sw.	32	sw.	27	9	10	12	12	5.1	6.1	4	81	1888	24	1887
N. Pac. Coast Region					54.8	+ 3.5									0.68	+ 0.66																	
Fort Canby	179	29.72	29.92	0.98	56.3	+ 3.3	70	60.9	44	51.7	20	3	51.8	85.2	8.08	— 3.41	8,779	se.	72	s.	1	2	13	16	19	5.9	7.2	7	72	1887	40	*
Neah Bay					54.0		67	60.0	39	48.0	23	5			7.57	— 2.64		e.				3	9	19	16			6	68	1888	31	1886
Olympia	36	29.91	29.95	0.97	54.0	+ 4.0	74	62.2	37	45.8	31	5	50.9	91.1	4.30	— 0.43	2,083	s.	20	s.	1	8	8	15	18	5.5	6.7	12	74	*	23	1881
Port Angeles	14	29.91	29.92	0.93	49.6	+ 3.6	64	55.7	32	43.6	22	3	47.2	94.3	3.33	+ 0.47	1,916	w.	22	w.	1	5	1	25	18	7.2	7.6	6	64	*	29	1887
Pysht					51.1		64	56.8	37	45.4	22	6			4.79	— 1.64		e.				3	3	17	15			6	68	1886	30	1884
Tatoosh Island					54.1	+ 3.1	65	58.0	45	50.3	15	4			7.13	— 0.97		*							21			7	65	1889	38	1883
Astoria	38				57.6	+ 3.6	73	63.1	44	52.1	21	2			9.64	+ 4.86		sw.				8	11	12	19			5	75	1885	40	1886
Portland	80	29.86	29.95	0.98	57.2	+ 4.2	80	65.6	38	48.7	32	3	51.0	84.4	4.59	+ 0.26	3,148	nw.	25	s.	1	8	8	15	19	4.2	6.7	17	82	1885	31	1877
Roseburgh	323	29.45	30.00	0.98	54.6	+ 1.6	82	64.2	35	45.1	41	4	48.2	81.6	5.28	+ 2.60	1,786	nw.	20	s.	29	3	10	18	17	5.1	6.9	13	91	1885	22	1881
Mid. Pac. Coast Reg.					61.6	+ 0.6									7.24	+ 6.18																	
Eureka	64	29.92	29.98	0.90	56.2		71	62.8	41	49.7	22	5	51.6	86.2	8.36		3,388	se.	36	se.	7	4	10	17	19	5.7	6.9	3	82	1887	40	1887
Red Bluff	342	29.63	29.98	0.76	61.4	— 1.6	92	70.4	44	52.4	36	4	48.1	68.2	8.41	+ 7.20	5,174	*	39	se.	7	8	9	14	16	5.7	5.6	13	96	1887	32	1881
Sacramento	64	29.92	29.99	0.70	61.7	+ 0.7	94	71.6	42	51.8	39	4	51.0	74.3	6.02	+ 5.20	4,969	se.	30	s.	21	12	12	7	11	3.5	4.4	13	98	1885	36	1881
San Francisco	60	29.93	29.99	0.71	61.8	+ 2.8	87	68.0	51	55.5	28	4	52.7	78.2	7.28	+ 6.13	6,066	sw.	32	sw.	13	10	10	11	13	4.7	5.5	19	87	*	45	1881
Point Reyes Light					d56.1		649	959.6	47	52.6	129	29			8.21			s.				5	6	20	16			1	64	1889	47	1889
S. Pac. Coast Region.					65.8	+ 5.4									4.84	+ 4.10																	
Fresno	328	29.65	30.00	0.52	62.8		98	74.8	42	50.0	41	5	49.3	66.7	3.17		3,546	nw.	24	*	7	13	9	9	10	2.6	4.4	3	100	1887	40	1887
Los Angeles	330	29.65	30.00	0.31	66.3	+ 3.3	89	76.2	50	56.4	32	8	53.6	75.2	6.96	+ 6.48	2,893	nw.	20	e.	20	6	20	5	7	5.1	3.0	13	102	1885	41	1886
San Diego	93	29.91	30.01	0.30	65.4	+ 3.4	80	72.0	52	58.8	26	5	56.8	79.9	2.12	+ 1.71	3,497	nw.	24	se.	20	16	12	2	5	4.1	3.8	18	92	1879	44	1878

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more directions, dates, or years. † Precipitation measured at the Boston Water Works; takes the place of the measurement at the Signal Office. ‡ For twelve days. ‖ Gale, estimated at 40 miles.

Chart I. Tracks of Areas of L



WAR DEPARTMENT W
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SECRETARY OF
A. W. GREELY, Chief

NOTES.

The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate, respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations.

The dotted shading ( ) indicates fog belts.

The ruled shading ( ) indicates the position in which field-ice or icebergs were observed.

f Low Pressure. October, 1889.

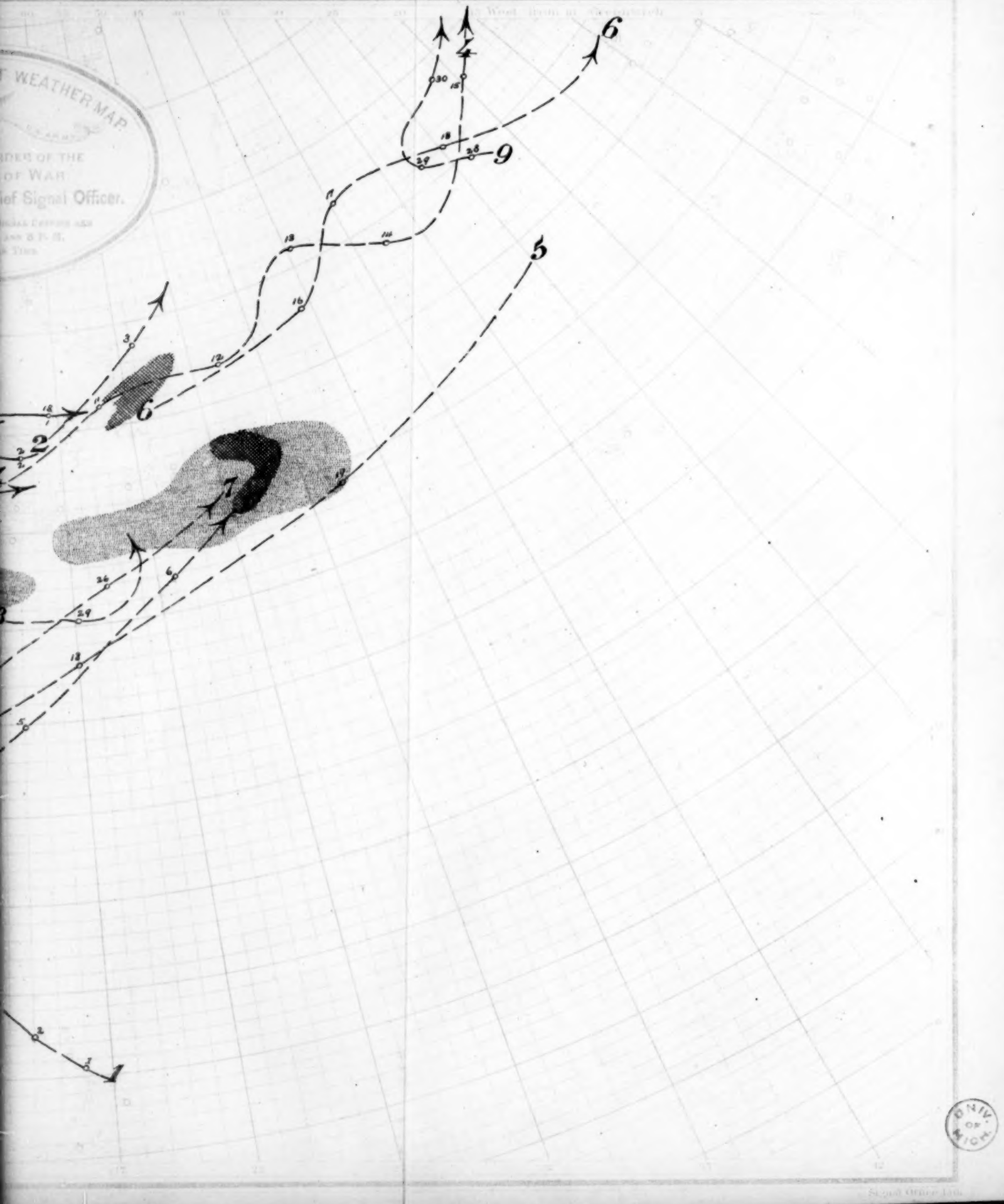
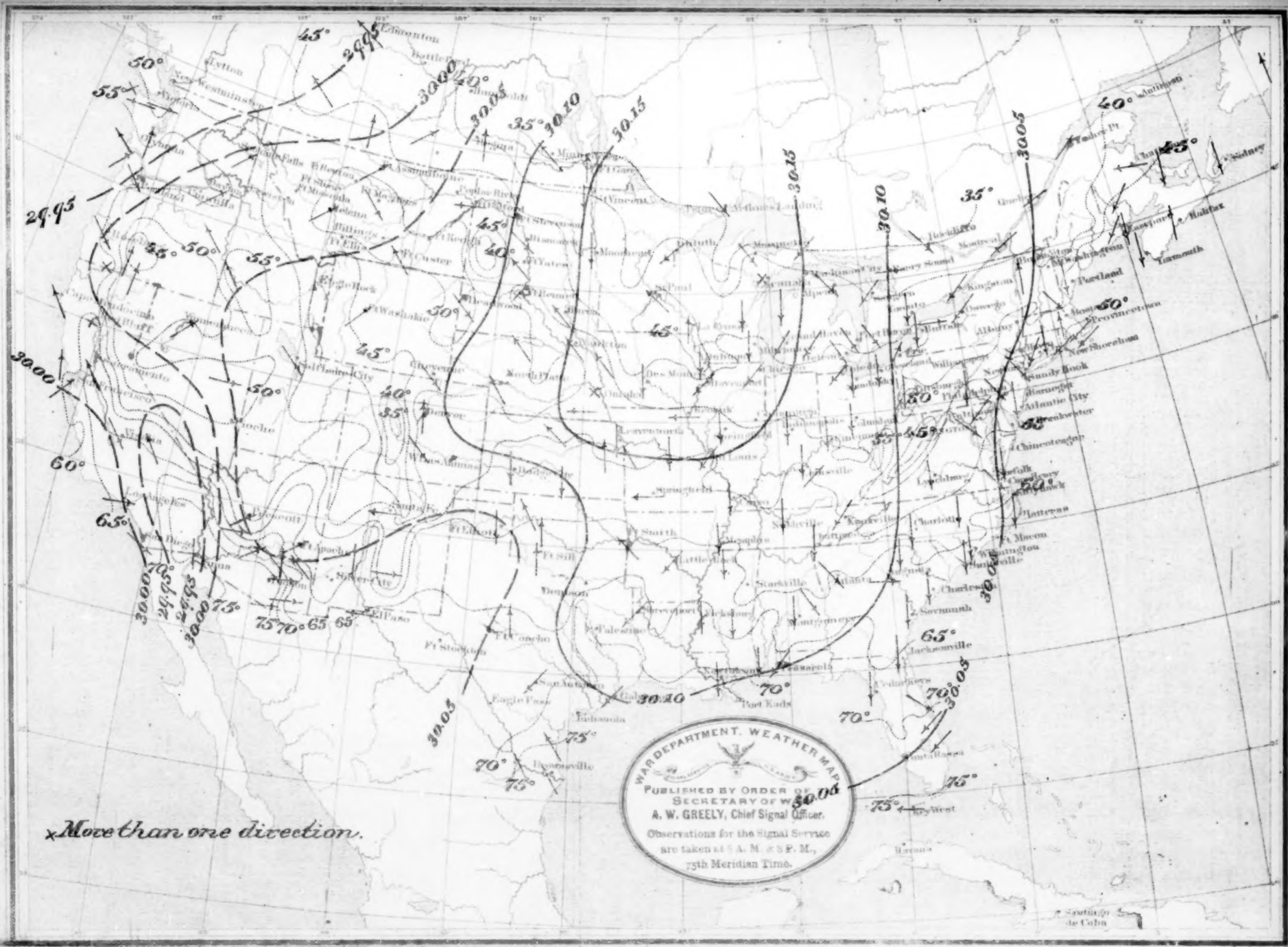


Chart II. Isobars, Isotherms, and Winds. October, 1889.

Form 106 F.

Chart II. Isobars, Isotherms, and Winds. October, 1889.


WAR DEPARTMENT. WEATHER MAP.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 5 A. M. & 5 P. M., 75th Meridian Time.
× More than one direction.

Signal Office Lith.

Chart III Precipitation, October, 1869.

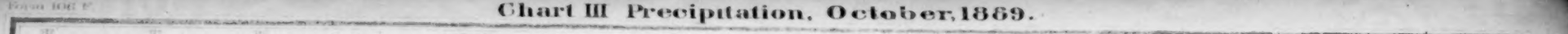


Chart III Precipitation, October, 1889.

No Rainfall
No Rainfall.
No Rainfall
No Rainfall
No Rainfall
Scale of Shades
0 to 2 Inches
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 8 A. M. & 8 P. M., 75th Meridian Time.

Form 106 P

Chart IV. Depth of Snow (inches) reported on ground October 31, 1889, and Limits of Freezing Weather.

Western Limit of Freezing Weather
Southern Limit of Freezing Weather
Trace
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 8 A. M. & 8 P. M., 75th Meridian Time.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Reports have not been received from those marked with an asterisk (*) in time to be used in the Review for October, 1889.

Place of observation and observer.

ALABAMA.
Auburn, Ala. Weather Service.
Bermuda, Wm. Fowler.
*Citronelle, J. G. Michael.
Columbiana, W. D. Lovett.
Double Spring, A. M. Weiler.
Livingston, Prof. J. W. A. Wright.
Mount Willing, W. M. Garrett.
Valley Head, E. P. Nicholson, M. D.
*Wiggins, M. D. Jones.

ARIZONA.
Antelope Valley, Mrs. J. H. Hamilton.
Ash Canyon, Jno. S. Robbins.
Ash Creek, Jno. H. Hudson.
Ash Sp'gs (Benson), J. D. Kinnear
Bangharts, Geo. Banghart.
Bisbee, Rev. J. G. Pritchard.
Buckeye, W. E. Hurley.
*Cedar Springs, B. E. Norton.
Cooley's, C. E. Cooley.
Chiracahua Mountains, D. D. Ross.
Dos Cabezas, T. C. Bain.
*Dragoon, J. W. Graham.
Eagle Pass, Dr. R. B. Tripp.
*Fairbank, S. W. Wood.
Flagstaff, M. J. Riordan.
Florence, A. T. Colton, C. E.
Gila Bend, D. Murphy.
Globe, J. H. Hamill.
Holbrook, David Rope.
Lochiel, Mrs. Alice F. Cameron.
Mount Huachuca, J. W. Stump.
New River, J. F. Singleton.
Phœnix, S. H. Campbell.
*Seligman, R. O. Le Grand
Signal, Henry Koshland.
Strawberry, L. P. Nash.
Teviston, Miss Mary Tevis.
Tip Top, F. E. Wager.
Tucson, Edward L. Wetmore.
*Volunteer Sp'gs, W. J. Hill.
*Walnut Grove, T. B. Carter.
Williams, J. T. Ryan.
*Willow Springs, F. A. Chamberlin.
Winslow, J. A. Scott.

ARKANSAS.
Lead Hill, Silas C. Turnbo.
Little Rock, Arkansas Weather Service.
Winslow, Albert Dunlap.

CALIFORNIA.
American Hill, T. L. Dwight.
Anderson, Dr. A. Fouch.
Arcata, H. L. Fry.
Barstow, Geo. R. Gooding.
Berkeley, Prof. F. Soulé.
*Campo, S. E. Gaskill.
Centreville, Wm. Barry.
Colegrove, Seward Cole.
Crescent City, D. S. Shotwell.
Evergreen, S. Holland.
Ferndale, J. H. Frost.
Georgetown, C. M. Fitzgerald.
Grass Valley, B. F. Berriman.
Hydesville, E. T. Foss.
Iowa Hill, C. F. Macy.
Jolon, T. T. Tidball.
Julian, L. N. Bailey.
La Grange, Jos. Dominica.
Los Banos, A. Widmann.
Mount Hamilton, Lick Observatory.
National City, J. E. Boal.
Needles, Chas. O. Johnson.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
Riverside, W. E. Keith.
Sacramento, S. H. Gerrish.
Salinas, Dr. E. K. Abbott.
Santa Barbara, H. D. Vail.
Santa Clara, A. Block.
Santa Maria, L. E. Blochman.
Sonoma, R. Hall.
Steele's, A. T. Mason.
Stockton, W. W. Trivett.
Susanville, T. B. Sanders.
Tuohy's, John Tuohy.
Upper Mattole, W. H. Roscoe.
Vacaville, G. O. Colburn.
Walla Walla Creek, J. Titcomb.
Walnut Creek, A. L. Bancroft.
Wheatland, Wm. Lumbard.
Willow, David Bentley.

COLORADO.
Colorado Springs, Colo. W'er Ser.
Delta, J. A. Curtis.
Denver, Rev. Wm. Forstall.
Fraser, L. D. C. Gaskill.
Fort Collins, Prof. L. G. Carpenter.
Georgetown, W. A. Jayne, M. D.
Greeley, E. Bethel.
Palmer Lake, Thos. Gaddes, M. D.
Rocky Ford, F. Watrous.
Del Norte (San Luis Experiment Station), H. N. Griffin.

CONNECTICUT.
Hartford, W. W. Ellsworth.
New Hartford, Rev. Wm. Goodwin.
Southington, Luman Andrews.
Yalantown, Rev. E. Dewhurst.

DAKOTA.
Alexandria, L. C. Taylor.
Brookings, Prof. Lewis McLouth.
Canton, W. M. Cappett.
Clark, W. H. Boals.
Davenport, J. W. Leech.
De Smet, Thos. H. Ruth.
Gallatin, S. J. Pound.
Huron, Dakota Weather Service.
Kimball, A. S. Stuver.
Napoleon, J. H. Hoof.
New England City, E. S. Clough.
Onida, Mrs. M. F. Goddard.
Roscoe, C. H. Spencer.
Spearfish, J. H. Warren.
*Spring Lake, A. Gould.
Steele, F. R. Hill.
Wahpeton, C. I. Croft.
Webster, Arthur Betts.
Wolsey, G. W. Frink.
Woonsocket, L. O. Libbey.

DELAWARE.
Kirkwood, Wm. Carnagy.

FLORIDA.
Altamonte Sp'gs, M. E. Bingham.
Alva, Chas. E. Robins.
Archer, A. F. Wyman.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
Lake City, Dr. J. C. Neal.
Madison, Livingston Vann.
Manatee, Mrs. Mary W. Broberg.
Matanzas, Mrs. B. E. Dupont.
Merritt's Island, Rev. J. H. White.
Tallahassee, Rev. Dr. W. H. Carter.
Villa City, J. Emory Round.

GEORGIA.
*Andersonville, H. W. Bryant.
Athens, Prof. L. H. Charbonnier.
Diamond, Wm. Kimzey.
Duck, A. L. Gillespie.
Forsyth, Thos. G. Scott.
Gillsville, C. W. Meaders.
Hephzibah, R. L. Rhodes.
Marietta, G. S. Owen.
Milledgeville, S. A. Cook.
Monticello, G. F. Meriwether.
Perry, C. H. Moore.
Point Peter, C. W. Witcher.
Quitman, J. L. Cutler.
Swainsborough, J. P. Pughsley.
Thomasville, C. S. Boudurant.
Woolley's Ford, A. J. Julian.

IDAHO.
Era, Hervey Brooks.
Kootenai, David McLaughlin.
Lewiston, Robert Schleicher.
Soda Springs, L. C. Eastman.

ILLINOIS.
Aurora, W. Holden.
Charleston, J. B. Dazey.
Collinsville, Dr. J. L. R. Wadsworth.
Louisville, E. E. Jenkins.
Mattoon, Wm. Dozier.
Mount Morris, Wm. Feary.
Oswego, John S. Seely.
*Palestine, John E. Templeton.
Peoria, Dr. Fred. Brendel.
Philo, H. A. Burr.
Riley, John W. James.
Rockford, T. D. Robertson.
Sandwich, Dr. N. E. Ballou.
South Evanston, Dr. M. D. Ewell.
Springfield, Ill. Weather Service.
Sycamore, Roswell Dow.
Windsor, A. H. Hatch.

INDIANA.
Butlerville, C. F. Hole.
Dana, J. E. Wright.
Jeffersonville, J. C. Loomis.
La Fayette, Ind. Weather Service.
La Fayette, Purdue Institute.
Maury, Elwood Kirkwood.
*New Providence, Prof. E. S. Hallett.
Point Isabel, Jas. F. Hood.
Scalesville, Urias Wilson.
Sunman, Dr. E. B. Vincent.
Vevay, Prof. Chas. Boerner.

INDIAN TERRITORY.
Caddo Creek, B. Leming, M. D.
Jimtown, M. M. Yeakly.
Lehigh, F. M. Madden.

IOWA.
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
Bancroft, H. N. Renfrew.
Belle Plain, H. W. Vandike.
Blakesville, James Rogers.
Carroll, Moses Simon.
Carson, G. N. Ferguson.
Cedar Rapids, H. D. Olds.
Clarinda, A. S. VanSandt.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
*Des Moines, Adolphus Voegeli.
Des Moines, Iowa Weather Crop Bulletin Service.
Eagle Grove, C. A. Schaffer.
Elkader, J. N. Hamilton.

IOWA—Continued.
*Estherville, J. H. Barnhart.
Fayette, R. Z. Latimer.
Fort Madison, Miss. L. A. McCready.
Gillett, H. L. Pierce.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Grinnell, Prof. S. J. Buck.
Hampton, E. C. Grenelle.
Humboldt, Miss Florence Prouty.
Independence, Emil F. Wülfke.
Iowa City, Prof. A. A. Veblen.
*Jefferson, S. M. Taylor.
Logan, Mrs. M. B. Stern.
McCausland, Miss Ruby P. Barr.
*McGregor, A. F. Hofer.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers, M. D.
Monticello, H. D. Smith.
Mount Pleasant, Dr. Max E. Witte.
Mt. Vernon, Prof. Alonzo Collin.
*Muscatine, J. P. Walton.
Osage, G. D. Pattingill.
Oskaloosa, Joseph Boyd.
Sac City, Dr. Caleb Brown.
Storm Lake, A. J. Bond.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Webster City, C. M. Trumbauer.
Wesley, Wm. Ward.
West Bend, Philip Dorweiler.

KANSAS.
Allison, John J. Cass.
Bendena, G. Campbell.
Cunningham, E. Shaw.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. T. H. Dinsmore, jr.
Englewood, C. D. Perry.
Fremont, E. Atkin.
Globe, Wm. Featherston.
Havensville, L. W. Dennen.
Independence, J. M. Altaffer.
La Harpe, Isaac S. Coe.
Lawrence, Prof. F. H. Snow.
Lebo, C. B. Jennings.
*Leoti, R. A. Ramey.
Macksville, C. E. Poling.
Manhattan, C. M. Breese.
Mankato, E. H. Kern.
*Manhattan, F. J. Rogers.
Morse, R. P. Edgington.
*Rago, D. S. Stratten.
*Rome, D. M. Adams.
*Salina, J. H. Gibson.
Sedan, J. W. Goodell.
Topeka, Kansas Weather Service.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran.
*Wellington, John H. Wolfe.
Yates Center, F. R. Gray.

KENTUCKY.
Ashland, J. M. Ferguson.
Bowling Green, M. H. Crump.
Caddo, H. B. Bonar.
Canton, C. H. Major.
Earlington, J. B. Atkinson.
Falmouth, F. G. Held.
Frankfort, E. C. Went.
Franklin, T. W. MacGill.
Louisville, Ky. Weather Service.
Millersburgh, Rev. C. Pope.
Mount Sterling, H. C. McKee.
Murray, J. P. Jones.
Owenton, J. S. Cox.
Pellville, Oscar Haynes.
Richmond, Prof. O. A. Kennedy.
Shelbyville, H. W. Prissler.
South Fork, A. B. Gilbert.
Springfield, W. U. Ray.

LOUISIANA.
Cameron, Hon. S. P. Henry.
Columbia, J. W. McGinnis.
Grand Coteau, Rev. Jos. A Raby, S. J.
Houma, H. F. Belanger.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
Marksville, Leon Molenar.
New Orleans, La. Weather Service.
Point à la Hache F. C. Myers.
Winnfield, J. M. McCain.

MAINE.
*Bar Harbor, Joseph Wood.
Cornish, Silas West.
Farmington, J. M. S. Hunter.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.

MARYLAND.
Barren Creek Springs, Albert E. Acworth.
Cumberland, E. T. Shriver.
Cumberland, H. Shriver.
Fallston, Prof. G. G. Curtis.
Frederick, McClintock Young.
Gaithersburgh, J. T. De Sellum.
Galena, Henry Parr.
*Gambrills, J. E. Moque.
Jewell, Jos. Plummer.
McDonogh, McDonogh Institute.

MARYLAND—Continued.
Mt. St. Mary's, Mt. St. Mary's College.
Woodstock, Woodstock College.

MASSACHUSETTS.
Amherst, Miss S. C. Snell.
Amherst, Mass. Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observ'y, A. L. Rotch.
Cambridge, Harvard College Observatory.
Chestnut Hill, D. Fitzgerald.
Dudley, Conant Observatory.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Holyoke, J. W. Doran.
Leicester, Arthur Kendrick.
Nahant, Dr. Wm. D. Hodges.
New Bedford, Thos. R. Rodman.
Newburyport, F. V. Pike.
North Billerica, C. H. Kohlrausch.
Provincetown, John R. Smith.
Royalston, Miss Lizzie W. Chase.
Somerset, Elisha Slade.
Taunton, E. U. Jones, M. D.
Westborough, G. S. Newcomb.
*Williamstown, Williams College Observatory.
Worcester, J. B. Hall.

MICHIGAN.
Benton Harbor, Dr. H. V. Tutton
Berrien Springs, F. A. Zerby.
Birmingham, S. Alexander.
Harrisville, Dr. D. W. Mitchell.
Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Lansing, Mich. Weather Service.
Marshall, G. H. Greener, M. D.
Mottville, J. A. Hartsler.
Thornville, John S. Caulkins.
Traverse City, S. E. Wait.
Ypsilanti, J. C. Bemiss.
Ypsilanti, C. S. Woodard.

MINNESOTA.
Le Sueur, L. B. Davis.
Minneapolis, Wm. Cheney.
Montevideo, Lloyd G. Moyer.
Osseo, Wm. Krueger.
Saint Charles, H. W. Hill.
Saint Paul, Minnesota Weather Service.
Sheldon, L. Curry.

MISSISSIPPI.
Fayette (near), I. N. Bedford.
Kosciusko, L. Heyman.
Logtown, Capt. C. D. Koch.
Louisville, B. T. Webster.
Pontotoc, C. W. Bolton, M. D.
Ripley, E. N. Hunt.
*Summit, J. N. Teunisson.
University, Mississippi Weather Service.
Waynesborough, W. S. Daries.

MISSOURI.
Brunswick, L. Benecke.
Carthage, Dr. J. G. Reaser.
Columbia, Mo. State Board of Agriculture.
Conception, Rev. Fr. Paul.
Excelsior Springs, A. Reinisch.
Fayette, Prof. T. Berry Smith.
Frankford, W. W. Vermillion.
Glasgow, Prof. C. W. Pritchett.
Grand Pass, E. R. Graham.
Harrisonville, A. J. Sharpe.
Hermann, Chas. Maushund.
Ironton, W. H. Delano.
Kansas City, S. J. Spurgeon.
Kidder, F. D. Chubbuck.
La Monte, J. S. Slaven.
New Frankford, G. W. Hawkins.
New Haven, Max Eimbeck.
*Oak Ridge, Henry Bruihl.
Ozark, J. J. Brown.
Princeton, Dr. Wm. Hirons.
St. Charles, L. C. Sager.
St. Charles, Dr. J. R. Mudd.
*Savannah, R. Van Buskirk.
Sedalia, C. G. Taylor.
Shelbina, J. S. Chandler.
Steelville, E. A. Pinnell.
Warrenton, Prof. J. H. Frick.
Warrensburg, G. L. Osborne.
Willow Springs, Capt. Wm. Hugh.
Withers Mill, J. R. Dudley.

MONTANA.
Glendive, J. H. Ray.
Fort Logan, Wm. Gaddis.
Powder River, J. M. Graham.
Sheldon, Sarah E. Sheldon.
Virginia City, Eugene Stark.

NEBRASKA.
Alliance, J. D. Sharts.
Ansley, P. Fowlie.
*Bingham, W. C. Wood.
Creighton, George Roberts.
Crete, Nebr., Weather Service.
Crete, G. I. Gilbert.
De Soto, Chas. Seltz.

NEBRASKA—Continued.
Fairbury, Dr. I. Humphrey.
Falls City, A. B. Newkirk.
Fremont, Isaac E. Heaton.
Genoa, George S. Truman.
Gering, Jno. P. Finley.
Grant, G. W. Talbot.
*Holmesville, H. E. Sillik.
Hay Springs, Wm. Waterman.
Howe, G. D. Carrington.
Kennedy, Mrs. M. G. Ericson.
*Kimball, D. Henderson, Jr.
Lexington, J. M. Tipton.
*Marquette, John Ellis.
North Loup, E. W. Black.
Saronville, A. B. Hollenbeck.
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.
Weeping Water, G. Treat.

NEVADA.
Carson City, Chas W. Friend.
Carson City, Nevada Weather Service.

NEW HAMPSHIRE.
Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
North Sutton, C. E. Hosmer.
Shaker Village, N. A. Briggs.
Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough, } Lake Winipiseogee Cotton and Woollen Manufacturing Co.

NEW JERSEY.
Beverly, C. F. Richardson.
*Egg Harbor City, H. Y. Postma.
Jersey City, Wright Babcock.
Moorestown, Thos. J. Beans.
New Brunswick, N. J. Weather Service.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
Woodbury, W. T. Wilson.

NEW MEXICO.
Albuquerque, S. M. Rowe.
Chama, E. A. Southerland.
Coolidge, B. S. Mullin.
Eddy, C. B. Eddy.
Gallinas Spring, J. E. Whitmore.
Hillsborough, J. E. Smith.
Las Vegas, F. W. Chatfield.
Los Lunas, Richard Pohl.
Nogal, José M. Vega.
Red Canyon (Carthage), R. H. Hills
Roswell, M. A. Upson.

NEW YORK.
Alfred Centre, F. S. Place.
Angelica, J. P. Slocum.
Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
Boyd's Corners, Thos. Manning.
Brooklyn, Prof. W. C. Peckham.
Canton, Prof. Henry Priest.
Constableville, R. Sanford Miller.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Elmira, Gerity Brothers.
Factoryville, T. P. Yates.
Fleming, Robt. Warwick.
*Friendship, Jesse D. Rogers.
Geneva, Mrs. N. S. Yates.
Hess Road Station, C. H. Spaulding.
Honeymead Brook (Stanfordville), James Hyatt.
Humphrey, Chas. E. Whitney.
Ilion, G. A. Trowbridge.
Ithaca, Cornell University.
Ithaca, N. Y. Weather Service.
Kingston, H. A. Stone.
Lowville, W. Hudson Stephens.
Lyons, Dr. M. A. Veeder.
Middleburgh, F. X. Straub.
*Newfane Station, F. B. Clark.
New York City, Central Park Observatory.
Nineveh, W. J. Barnett.
North Hammond, C. A. Wooster.
Number Four, Chas. Fenton.
Palermo, E. B. Bartlett.
Palmyra, L. D. Cummings.
Pendleton, W. D. Lovell.
Perry City (near), W. H. Jeffers.
Potsdam, Peter Vilas; G. W. F. Smith.
*Queensbury, De Witt C. Jenkins.
Rome, Dr. H. C. Sutton.
Saranac Lake, Jas. P. Mills.
Savona, M. S. Collier, M. D.
Schnectady, C. Butler.
Setauket, Selah B. Strong.
*Somerset, J. W. Thurber.
South Canisteo, J. E. Wilson.
South Kortright, D. C. Sharpe.
Spencerport, F. A. Winne.
Turin, R. T. Church.
Utica, Thomas Birt.
Wedgewood, O. F. Corwin.
White Plains, Prof. O. R. Willis.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for Monthly Weather Review—Cont'd.

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
NORTH CAROLINA.	OREGON—Continued.	TENNESSEE—Continued.	UTAH—Continued.	WISCONSIN—Con.
Asheville, Dr. Karl von Ruck.	La Grande, J. K. Romig.	Nashville, State Board of Health.	Alta, Bingham, Ogden, Park City, Provo, Stockton, } Bell Telephone Co., Salt Lake, Utah.	Friendship, J. M. Harrison.
Chapel Hill, Prof. J. W. Gore.	Mt. Angel, Rev. F. Barnabas Held.	Riddleton, F. K. Fergusson.		Glasgow, Henry M. Crombie.
Grover, F. H. Dover.	Portland, Oreg. Weather Service.	TEXAS.	VERMONT.	Grantsburgh, M. L. Roby, M. D.
Lenoir, Dr. R. L. Beall.	Tillamook, A. P. Wilson.	Austin, Oscar Samostz.	*Brattleborough, W. H. Childs.	Greenwood, H. J. Thomas.
Mount Pleasant, H. L. T. Ludwig.	PENNSYLVANIA.	Austin, Q. C. Smith, M. D.	Burlington, W. B. Gates.	Hayward, J. M. Custard.
Raleigh, Thos. C. Harris.	Altoona, Chas. B. Dudley, M. D.	Bear Creek Ranche, W. H. Potter.	East Berkshire, H. B. Lovering.	Horicon, C. L. Carr
Raleigh, North Carolina Weather Service.	Aqueduct, D. M. Sheeley.	Benjamin, T. J. Kenan.	Hartland, Rev. A. Hazen.	Honey Creek, Wis., J. A. McIntosh.
Soapstone Mount, H. L. Kimrey.	Blooming Grove, John Grathwohl.	Brazoria, H. Stevens.	Lunenburgh, Dr. Hiram A. Cutting	Lincoln, A. J. Looze.
Weldon, T. A. Clark.	Blue Knob, A. H. Boyle.	Brownwood, J. F. Mayo.	Manchester, Rev. E. P. Wild.	Madison, Washburn Observatory.
OHIO.	Catawissa, Robt. M. Graham.	Childress, G. H. Chipman.	Saint Johnsbury, F. Fairbanks.	Manitowoc, Miss Clasina Lüps.
Bellevue, Wm. Sheffield.	Corry, Wm. Loveland.	Cleburne, P. J. Norwood.	Strafford, H. F. J. Scribner.	Neillsville, W. Henslett.
Bement, P. W. Barton.	Drifton, H. D. Miller.	Coldwater, J. W. O'Brien.	VIRGINIA.	Richland Centre, Dr. H. M. Ludwig
Carrollton, P. M. Herold.	Dyberry, Theo. Day.	College Station, Tex., Prof. Duncan Adriance.	Bolar, G. F. Eakle.	Summit Lake, E. S. Koepenick.
Cleveland, G. A. Hyde.	Easton, Dr. J. W. Moore.	*Colorado, Fred R. Blount.	Birdsnest, C. R. Moore.	Viroqua, F. J. Bold.
College Hill, John W. Hammitt.	Edinborough, C. F. Sweet.	*Corsicana, W. H. Hamilton.	Christiansburgh, H. D. Walters.	Waucousta, G. H. Yapp.
*Collinwood, Wm. Smeed.	Franklin, Joseph Bell.	Decatur, H. D. Donald.	Dale Enterprise, L. J. Heatwole.	Wausau, Hinemann Bros.
Columbus, Ohio Weather Service.	Germantown, Thos. Meehan.	Duval, J. C. Edgar.	Lexington, Prof. H. D. Campbell.	*Weston, R. R. Wilkinson.
Demos, B. B. Ault.	Grampian Hills, Nathan Moore.	Epworth, H. Graves.	Liberty, W. N. Stone.	Wauseka, C. Rice.
Elyria, C. W. Goodspeed.	Haverford, H. V. Gummere.	Fort Worth, Jas. G. Mallett.	Middletown, A. G. Prior.	WYOMING.
Garrettsville, S. M. Luther.	Le Roy, Geo. W. T. Warburton.	Fredericksburgh, Arthur Striegler.	Mossingford, R. V. Gaines.	Carbon, J. A. Shannon.
Jacksonborough, Dr. J. B. Owsley.	Meadville, David Logan.	*Gainesville, D. F. Ragsdale.	Nottaway, Geo. Dunn.	Evanston, Ira B. Moor.
Kent, P. W. Eigner.	Meshoppen, Stephen S. Jenkins.	Gallinas, Lum Woodruff.	Petersburg, Jas. M. Colson, jr.	Lusk, F. S. Lusk.
Kenton, L. J. Demarest.	Nisbet, J. S. Gibson.	Galveston, Tex. Weather Service.	Richmond, W. H. Pleasants.	Saratoga, J. F. Crawford.
Leipsic, J. D. Hadermann.	Petersburgh, J. E. Rooney.	Graham, A. B. Gant.	Smithfield, J. R. Purdie.	Wheatland, M. R. Johnston.
Lordstown, W. S. Dean.	Philadelphia, Pennsylvania Weather Service.	Hartley, C. F. Conklin.	Spottsville, B. W. Jones.	FOREIGN.
Napoleon, Dr. T. C. Hunter.	Philipsburgh, G. F. Dunkle.	Howe, W. M. Smith.	Summit, J. R. Sinn.	*Burnside, S. A., Dr. C. J. Hering.
New Athens, Jos. Holmes.	Pleasant Mount, J. D. Brennan.	La Grange, Jos. Cottam.	University of Virginia, James Wearmouth.	Grand Turk, West Indies, Geo. I. Gibbs.
North Lewisburgh, H. D. Gowey.	Quakertown, J. L. Heacock.	Lampasas, Dr. C. M. Ramsdell.	Wytheville, Howard Shriver.	Guanajuato, Mexico, Meteorological Observatory.
Orangeville, E. N. Hyde.	Reading, C. M. Dechant.	Merkel, J. L. Vaughan.	WASHINGTON TERRITORY.	Hamilton, Bermuda, Gen. Russell Hastings.
Portsmouth, Dr. D. B. Cotton.	Salem Corners, T. B. Orchard, M. D.	Mesquite, Silas G. Lackey.	Blakely, R. M. Hoskinson.	Havana, Cuba, Dr. Enrique del Monte.
Poland, Chas. Stewart.	State College, Agricultural Experimental Station.	Menardville, Louis Runge.	Vashon, Mrs. C. B. Carpenter.	Killisnoo, Alaska, Jos. Zuboff.
Salineville, J. W. Manning.	Tipton, Miss C. J. Wilson.	New Braunfels, Paul Wipprecht.	WEST VIRGINIA.	La Logia, Mexico, J. Byrns.
Shanesville, John Roth.	Troy, Rev. M. Gustin.	New Ulm, C. Runge.	Clarksburgh, R. T. Lowndes.	Leon, Mexico, Prof. M. Leal.
Shiloh, Peter Bowman.	Tuscarora, R. J. Mickey.	Pecos City, C. H. Merriman.	Ella, Henry Resseger.	Mazatlan, Mexcio, Leon P. Acosta
Tiffin, Rev. T. H. Sonedecker.	Wellsborough, Hiram D. Deming.	Panhandle, J. L. Gray,	Kingwood, J. E. Murdock.	Mexico, Mexico, Meteorological Observatory.
Vienna, W. D. McCorkle.	West Chester, Dr. Jesse C. Green.	Panter, E. H. Snider.	Pleasant Hill, D. Titchenell.	Monterey, Mexico, Dr. Wm. De Ryee.
Wauseon, Thos. Mikesell.	RHODE ISLAND.	Round Rock, W. Weiss.	Seven Pines, J. R. Shaver.	Montreal, Quebec, C. H. McLeod.
Westerville, Prof. John Haywood.	Kingston, C. O. Flagg.	Silver Falls, C. M. Tilford.	Rowlesburgh, M. J. Coniff.	New Westminster, B. C., Capt. A. Peele.
West Milton, Luke S. Mottie.	SOUTH CAROLINA.	Snyder, A. C. Wilmeth.	Tannery, G. H. Trembly.	Port au Prince, Hayti, Prof. I. Scherer.
Yellow Sp'gs, Miss Elisa G. Rice.	*Aiken, Dr. W. H. Geddings.	Sugar Land, W. P. Martin.	Tyler Creek, F. M. Swann.	Pueblo, Mexico, Catholic Institute.
OREGON.	Cedar Springs, J. F. Bayerly.	UTAH.	WISCONSIN.	Topolobampo, Mexico, Capt. Jno. Bell.
Albany, John Briggs.	Columbia, S. C. Weather Service.	Beaver, Rev. J. D. Gillilan.	Butternut, H. Besse, jr.	
Bandon, Geo. Bennett.	Kirkwood, Colin Macrae.	Levan, A. B. Larsen.	Cadiz, B. C. Curtis.	
Beulah, T. L. Arnold.	Port Royal, H. D. Elliott.	Losee, Ephraim Caffall.	Delavan, George H. Collie.	
East Portland, Dr. Geo. Wigg.	Statesburgh, Dr. W. W. Anderson.	Moab, H. J. Crouse.	Embarrass, J. E. Breed.	
Ellensburg, F. S. Moore.	Simpsonville, Miss N. L. Dawson.	Mount Carmel, Robert Moncur.	Fond du Lac, J. C. Wedge.	
Eola, Thos. Pearce.	Ashwood, Rev. C. F. Williams.	Mount Pleasant, Hans C. Davidson.		
Grant's Pass, Jno. G. Jessup.	Austin, P. B. Calhoun.	Nephi, W. R. May.		
Heppner, Arthur Smith.	TENNESSEE.	Richfield, Neils Anderson.		
Jordan Valley, J. R. Blackaby.	Milan, Dr. M. D. L. Jordan.	Saint George, Seth A. Pymm.		

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for October, 1889.

ALABAMA.
Mount Vernon Barracks.

ARIZONA.
Apache, Fort.
Bowie, Fort.
Huachuca, Fort.
Lowell, Fort.
McDowell, Fort.
Mojave, Fort.
San Carlos.
Verde, Fort.
Whipple Barracks.

ARKANSAS.
Hot Springs.
Little Rock Barracks.

CALIFORNIA.
Alcatraz Island.
Angel Island.
Benicia Barracks.
Bidwell, Fort.
Gaston, Fort.
Mason, Fort.
*Presidio, San Francisco.
San Diego Barracks.

COLORADO.
Crawford, Fort.
Lewis, Fort.
Logan, Fort.
Lyons, Fort.

CONNECTICUT.
Trumbull, Fort.

DAKOTA.
A. Lincoln, Fort.
Bennett, Fort.
Buford, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sully, Fort.
Totten, Fort.
Yates, Fort.

DISTRICT OF COLUMBIA.
Washington Barracks.

FLORIDA.
Barrancas, Fort.
Saint Francis Barracks.

IDAHO.
Boisé Barracks.
Sherman, Fort.

ILLINOIS.
Rock Island Arsenal.
Sheridan, Fort.

INDIAN TERRITORY.
Gibson, Fort.
Reno, Fort,
Sill, Fort.
Supply, Fort.

KANSAS.
Hays, Fort.
Leavenworth, Fort.
Leavenworth Prison.
Riley, Fort.

KENTUCKY.
Newport Barracks.

LOUISIANA.
Jackson Barracks.

MAINE.
Kennebec Arsenal.
Preble, Fort.

MARYLAND.
McHenry, Fort.

MASSACHUSETTS.
Springfield Armory.
Warren, Fort.

MICHIGAN.
Brady, Fort.
Mackinac, Fort.
Wayne, Fort.

MINNESOTA.
Snelling, Fort.

MISSOURI.
Jefferson Barracks.

MONTANA.
Assinniboine, Fort.
Custer, Fort.
Keogh, Fort.
Maginnis, Fort.
Missoula, Fort.
Poplar River, Fort.
Shaw, Fort.

NEBRASKA.
Niobrara, Fort.

NEBRASKA—Cont'd.
Omaha, Fort.
Robinson, Fort.
Sidney, Fort.

NEW MEXICO.
Bayard, Fort.
Marcy, Fort.
Selden, Fort.
Stanton, Fort.
Union, Fort.
Wingate, Fort.

NEW YORK.
Columbus, Fort.
David's Island.
Hamilton, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburgh Barracks.
Porter, Fort.
Schuyler, Fort.
Wadsworth, Fort.
Watervliet Arsenal.
West Point Mil. Acad'my.

NEW YORK—Cont'd.
Willett's Point.

OHIO.
Columbus Barracks.

OREGON.
Klamath, Fort.

PENNSYLVANIA.
Allegheny Arsenal.
Frankford Arsenal.

RHODE ISLAND.
Adams, Fort.

TEXAS.
Bliss, Fort.
Brown, Fort.
Clark, Fort.
Davis, Fort.
Eagle Pass, Camp.
Elliott, Fort.
Hancock, Fort.
McIntosh, Fort.
Peña Colorado, Camp.

TEXAS—Cont'd.
Ringgold, Fort.
San Antonio, Post at.

UTAH.
Du Chesne, Fort.
Douglas, Fort.

VIRGINIA.
Monroe, Fort.
Myer, Fort.

WASHINGTON TER.
Canby, Fort.
Spokane, Fort.
Townsend, Fort.
Vancouver, Fort.
Walla Walla, Fort.

WYOMING.
Bridger, Fort.
D. A. Russell, Fort.
Laramie, Fort.
McKinney, Fort.
Pilot Butte, Camp.
Sheridan, Camp.
Washakie, Fort.